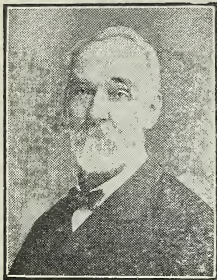


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Gleanings in Bee Culture





T. B. TERRY
In His Sixty-seventh Year

I am Still Gaining

That is what T. B. Terry says to-day, when he is 67 years old, after being so broken in health at 40 years of age that all the doctors who saw him and tried to help him gave him up to die. But Mr. Terry got well by working out his own cure. He tells all about it in his great health book.

"How to Keep Well and Live Long"

There is no other book like it in the world. You don't need to know medical words or medicines to understand it. It is written clearly and simply, and has back of it the personal experience which tried and proved every step of the way to a long and healthy life. You can follow the same way. The book is only one year old, but over 5150 copies of it, to date, are making men and women healthier and happier because they have read and followed the teachings of its pages.

READ BELOW what One Man Has to Say about THIS GREAT BOOK:

I enclose check for \$3.55, for which please send me five more copies of Mr. Terry's book. This makes 75 copies to date that I have sold, or, rather, distributed, all but these last five, and will eventually make it 100. Have given away quite a good many, and keep from two to four loaned out all the time. Gave my pastor two copies for the same purpose. Do not desire to make any clear profit on the sales; give to libraries and wherever I think they will do any good. The book has done me a great deal of good. I consider it a good thing and believe in passing a good thing along. We are not to blame if our light is small and not very bright, but we are to blame if we hide that light under a bushel. Before the book was issued I had interested a friend, a retired physician, in "Health Hints." He wanted a copy of the book as soon as out, and has bought in all 15 copies from me. He is an enthusiastic admirer of Mr. Terry—so much so that he got me to go with him to Ohio to see him last winter, and on our way home he said: "We found everything just as the book said, except Mr. Terry's picture; that does not do him half justice," and I say amen to that. The picture makes him look too old and half asleep. Would like to see a better one in the new edition. I gave a copy of the book to a near relative, an active practicing physician, who read it carefully and critically, and pronounced it

good. He takes The Practical Farmer and reads it every week. I asked him last week what he thought of Terry's teachings now. He said: "Good common sense, and we doctors need to learn a whole lot of common sense." My friends call me a crank on the subject of health. Well, a crank is used to move things. Many of my converts are as radical as I am. About Christmas I loaned our blacksmith a book; he has bought four copies now, three to loan. Talks health to every one who comes in the shop. He told me to-day he felt like a new man physically. "Could not have stood it long as I was feeling last fall." This is the kind of pay I like to get for my work. My last sale was to a very busy man who told me he had no time to read a book. I reminded him that his brother was just as busy a man as he, but one day a few months ago he found time to go to the hospital. The operation was very successful, but he died in a day or two. Another friend had no time to read a book—too busy. He has plenty of time now; had a stroke of paralysis, and the doctors say can never walk again. When a man or woman not in perfect health (and how many are?) tells me they have no time to read a book, I regard the statement just as I would were they to say, should I tell them their house was on fire, "Yes, I know it is; but I have not time just now to put it out."—T. T. HIBBEN, McKeesport, Pa.

Mr. Terry's Book, bound in cloth, is sold for \$1.00 or given with a year's subscription to "Gleanings in Bee Culture" for \$1.50

In connection with a year's subscription to GLEANINGS, 30 cents additional is required for orders from Canada, or 60 cents additional for orders from foreign countries.

Nearly a thousand copies of this helpful book have been distributed through the publishers of "Gleanings in Bee Culture," and not a single reader has expressed regret at his bargain. Mr.

A. I. Root heartily endorses Mr. Terry's writings on health subjects.

Gleanings in Bee Culture

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Editorial

MR. WESLEY FOSTER, in this issue, has a very fair article on honey-crop reports that is well worth reading.

E. R. Root left for Bradentown, Fla., March 4, and expects to return to his office on the 29th of the same month. This will explain why the answer to some of his letters may be delayed until his return.

THAT TOBACCO ARTICLE

In publishing the tobacco article as given on page 162 of this issue, it is not our purpose to boom or sanction an industry which we do not approve, but to show how bees pollinate the plant. In doing this we merely wish to show that if bees can pollinate what we consider to be of no real economic benefit to man they can also pollinate a plant that gives real life and health to both men and women.

EXTRA-LARGE EDITION OF OUR HORTICULTURAL NUMBER

We are printing an extra-large edition of this special number on "Bees and Fruit;" and if beekeepers will send us a list of the names of fruit men in their vicinity who might be helped by the educational articles on fruitgrowing published in this number, we shall be very glad to send them a copy without charge. In this way we hope to help the beekeepers themselves as well as the fruit men.

THE INCREASING DEMAND FOR BEES IN ORCHARDS

ELSEWHERE in this issue Prof. H. A. Surface, Economic Zoologist, Harrisburg, calls attention to the fact that there is an increasing number of orchardists who are asking to have bees located among their trees. Mr. N. E. France, General Manager of the National Beekeepers' Association, who has traveled extensively, finds that the fruit-growers over the country are either buying bees and putting them in their orchards, or are offering the free use of their orchards to beekeepers if they will only put their bees there. In most cases beekeepers will do well to hunt up the fruitgrowers and inform them of the important work performed by bees in pollinating their trees. This should

be done at once. By so doing good locations may be secured free of cost.

SEASON PROSPECTS

It is still too early to give any thing like a definite summary of the few reports on wintering that have come in. However, at this time it seems safe to say that the colonies in the northern States that were in good condition in the fall, and that were packed well out of doors, or wintered in good cellars, will come through without much loss. In those parts of the country where the winters are not usually severe, there seems to be quite a heavy loss, owing to the beekeepers having been taken unawares by the extreme cold. We may be mistaken; but at this date, March 11, it looks as though there might be a somewhat greater mortality, the country over, than usual.

The rain, so long delayed in California, came at last; but the general feeling is that the prospect of a honey crop is very doubtful outside of the irrigated districts, on account of the fact that sage and other honey-producing plants have made no growth owing to the very severe drouth.

In the South, the conditions in general seem to be normal, although in the southwestern part of Florida one-half to two-thirds of the colonies are dead. In the eastern and central part of the State, conditions are much better. Those in Georgia and those throughout the cotton belt, in fact, are in fine order; but those in other parts of the South, not near the cotton belt, are in rather poor condition, owing to the drouth during the latter part of the summer. In the clover regions of Mississippi and Alabama the bees are in good condition. Reports from the Carolinas indicate that there has been no more loss than usual.

Most of the few reports that we have from Illinois indicate rather heavy losses, although when the full returns are in, a summary of the whole state may not reveal serious losses. Scattering reports from other parts of the country do not show any thing very definite as yet. This winter has emphasized most plainly the importance of having the colonies headed by young, vigorous queens that will make certain a good proportion of young bees in the fall.

ORANGES AND BEES

THE cover design of this issue shows a beautiful orange tree in what is known as the Sespe apiary, belonging to Mr. J. F. McIntyre, of Ventura, Cal. The hives of bees are shown under the trees in the background, while the orange tree in the foreground is loaded with fruit. We regret that we are not able to show the beautiful color values of the oranges and the dark glossy leaves in contrast.

It might be interesting to recall that this apiary has, or did have, at least, something like 500 colonies in it. There seem to be only two yards in the United States that have as large a number of bees in one spot as this. The other apiary to which we refer is the Alexander yard, located at Delanson, N. Y.

The bees at the Sespe apiary work on the orange bloom in the immediate vicinity, and on the mountain sage when it yields. In this particular case, bees and fruit, or, if you please, bees and oranges, go well together.

HARD CANDY FOR WINTER AND SPRING FEEDING; HOW TO MAKE IT

INTO a dish of hot water on the stove slowly pour an equal amount of sugar, stirring constantly. Make sure that the sugar is all dissolved before boiling commences. If this precaution is not observed, some of the undissolved sugar is likely to burn, injuring the flavor of the candy and almost surely causing trouble with the bees later. If you have a candy thermometer, watch the temperature, and do not let it go above 275 to 280 degrees. Test frequently by dropping a very little of the syrup into cold water (about 50 to 55 degrees F.). When the boiling has continued long enough the drop of candy, when cooled in the water, should be hard and brittle when taken out; but when placed in the mouth it should soften slightly, so that it is tough. When this time has arrived, pour the syrup immediately on to paraffined or waxed paper on a table. Have the table perfectly level, and around the outside of the paper put wooden sticks $\frac{1}{4}$ -inch high to confine the syrup and prevent it from running off. When the candy is nearly hard, crease it or cut it with a heavy knife so that it may be broken up into right-sized squares when hard.

The color of the candy when cold should be about that of light basswood honey. If it is darkened very much it is scorched and unfit for the bees. To prevent the scorching, reduce the fire toward the last so that the syrup will boil but slowly.

When the candy is first made, it is hard and glassy, and perfectly transparent; but after it stands for a little time it becomes somewhat watery and crystalline; but this is all the better so far as the bees are concerned, for they are enabled to take it more easily.

The thin cakes of candy being only $\frac{1}{4}$ inch thick may be placed over the frames

and under the regular cover, and in this way a colony saved that would otherwise be lost. The feeding of syrup, especially in the spring, is apt to cause great excitement and possibly robbing, and for this reason the candy is safer because it takes it slowly.

BEES WORTH A HUNDRED MILLION DOLLARS AS POLLINATORS

HAVING occasion recently to deliver a talk on the relation of bees to horticulture, at the Ontario Agricultural College, Guelph, Canada, we made the statement that bees produce annually \$20,000,000 worth of honey; but that their economic importance to the fruitgrower and the consumers of fruit in this country could be measured by five times that in the production of more and better fruit and better crops. After we had concluded our talk we asked the botanist who heard this talk if this statement, in his opinion, was too strong. He very promptly replied that it was not.

Neither the beekeeper nor the fruitgrower fully realizes the important work the bees perform in pollinating fruit-blossoms throughout the country, especially the finer fruits such as plums, cherries, peaches, pears, and most apples. There are very few fruit trees that are self-pollinating. Charles Darwin made the statement that nature abhors self-pollination. As bees, in most cases, are about the only insects that are in the air at the time most of our trees are in bloom, it follows that they are the main sources of cross-pollination. Fortunately, our best horticulturists and fruitgrowers are to-day the bees' best friends. It is only the narrow-minded and the uninformed who complain of the bees being a nuisance in orchards and vineyards. The overripe and otherwise imperfect fruit from damage or otherwise should be picked off early and marketed locally rather than to hang on the trees, or, worse yet, lie on the ground in a half-rotted condition, attracting the bees.

The only time that bees are said to be a real nuisance is when cut fruit is placed out to dry in California and elsewhere. It may be questioned whether it is best to put out fruit to dry in some places subject to disease-laden germs of all sorts. It would seem that legislation should properly safeguard the outdoor drying; for why should we eat dried apricots and prunes that are coated with dust? We have been in *some* (not all) fruit-drying ranches in California where the dust was flying in all directions. If some of our Eastern consumers could see the way this fruit is exposed they would say better by far that the bees should eat it *all*, rather than have it placed on our tables laden with disease-bearing germs.

BEES AND GRAPES

COMPLAINTS seem to be increasing of how bees "eat grapes." In every case that has come under our observation we do not know of *one* where the bees were the real and pri-

mary cause of the damage to the fruit. We would call attention to the excellent reply to a correspondent by Prof. H. A. Surface, Economic Zoologist, Harrisburg, Pa., on this subject, in this issue. See page 158. Prof. Surface is one of the best authorities in the country on the relation of bees to horticulture. He has conducted some thorough experiments, and furthermore is an entomologist, zoologist, fruitgrower, and beekeeper. What he has to say in this issue should be given some weight.

We find that the Cape May warbler (*Dendroica tigrina*) is the real culprit, and not the bees, in this locality at least; and we have reason to believe that in many others the small holes made in the grapes attributed to the bees are made by these birds that come on early in the morning. They run their beaks into every berry in a bunch. Instead of using up one berry they make a single hole in every berry, thus ruining the whole bunch. Indeed, they will go over a whole vineyard in that way. As one is not usually up at that time of day, the birds are not discovered. The bees come along about eight o'clock, and, of course, run their tongues down into the holes made by the birds. The bees are caught in the act; and after they leave, these small holes are discovered. The natural conclusion is that the bees are responsible for the whole trouble. Beekeepers should take pains to inform their grape-growing neighbors about these birds.

PUBLIC SENTIMENT GROWING AGAINST THE SPRAYING OF FRUIT BLOSSOMS.

In any locality where there are fruit-growers so behind the times, and so ignorant as to insist on spraying their trees while in bloom, it is a good plan to create a public sentiment against the practice. The leading experiment stations and horticulturists in the country are now very explicit in their condemnation of blossom-spraying, so there is no lack of evidence, even from a fruit-grower's standpoint, showing that it is a bad plan. One way of creating such a sentiment is to get the editor of the local paper to accept an article that is at once interesting and readable, and yet full of proof that fruit blossoms should not be sprayed.

One of our subscribers, E. L. Dresser, of Ithaca, N. Y., who has had considerable trouble along this line, was at last stung into action, and he sent to the Ithaca *Daily Journal* a statement in which he spoke his mind on the subject. We have not room for the whole article, but we give herewith parts of it to show what can be done:

To the Editor of The Journal:—A short time ago our sensibilities were shocked by the accounts of a mother who poisoned her child by compelling it to drink carbolic acid. So outraged was the public, that when the woman was taken to Albany for trial, mob violence was feared, and a special force was called out to guard the prisoner from the station to the jail.

Yet within our own "Biggest Little City" last summer thousands of little lives were destroyed by poison, no account of which reached the papers, nor was it of any seeming consequence save to a few interested parties.

The honey-bee is the friend of humanity. Not only do these little gatherers produce annually thousands of tons of the most delicious and healthful sweet known to man, but in their quest they pollinate the flowers, and thus multiply by many bushels and barrels the fruits and vegetables to the enrichment of the producer and the benefit of the consumer. Thus the honey-bee is a friend not only to the orchardist and fruitgrower, and every one who has a fruit tree in his yard or a vine in his garden, but to the whole human race.

After many careful experiments at both the State Experiment Station and the Cornell Agricultural College, the conclusion was reached that, to spray the fruit trees when in bloom, is a positive damage (see Experiment Station Record, Vol. 13, p. 364).

As a result, the Legislature passed the following law:

"Any person who shall spray with or apply in any way poison or any poisonous substance to fruit trees while the same are in blossom is guilty of a misdemeanor punishable by a fine of not less than ten nor more than fifty dollars, etc." (see Chap. 171 of laws of 1900).

C. E. Layman, of Troutville, Va., in an article in *GLEANINGS IN BEE CULTURE*, March 1, 1911, says: "I have had a great deal of experience in the spraying of fruit, and have watched some of my neighbors frequently who persisted in spraying while trees were in bloom, and in nearly every instance their fruit was damaged more or less, while my trees, which had not been sprayed until after the bloom dropped, were full of perfect fruit. There can not be any doubt about this point in my mind, as has been so thoroughly demonstrated in this section."

An extensive orchardist of Washington writes in the *Pacific Homestead* of last October, "I am satisfied that most orchard men do not realize the importance of proper cross-pollination of their fruit. Inasmuch as the bee is practically the only insect flying at the time apple trees are in blossom, their chief reliance must be placed upon it. While wind does carry pollen to a certain extent, many experiments have shown that it is only to a slight degree. It will pay the fruitgrower to keep bees to pollinize his fruit, or at least he should be willing to encourage some of his loving neighbors to keep them."

Mr. Terry, president of the Vermont Horticultural Society, in a recent public address said that in Grand Isle Co., where are located some of the best orchards in the State, he and another party examined every orchard with great care to discover if possible the cause of failure in some to produce as heavily as the others.

The results of examination showed in every instance that, where there were failures to produce abundantly, there were no bees, or too few to be of much use; and further, that, where a good supply of bees was kept, there was in every instance a large apple crop.

Ithaca, May 1, 1911.

E. L. DRESSER.

Another way to create public sentiment is to have some good speakers at farmers' institutes, horticultural-society meetings, etc., to present the matter and show the good work that the bees do, as well as to make it clear that, even from a fruitgrower's standpoint, blossom-spraying is not advisable. The following clipping from *Successful Farming* illustrates just what we mean:

THE AID OF BEES IN ORCHARD WORK.

At a recent meeting of the Vermont Horticultural Society much emphasis was placed upon the keeping of bees. Last season was wet and cold in spring, and not conducive to a good fruit crop; and those who have set and cared for large orchards of their own have observed that the orchards or parts of orchards near stands of bees bore well while those at a distance did not. The apple blossom is so constructed as to render the work of bees necessary to pollination.

This is the reason why trees bear so much better and more evenly in warm dry seasons.

One speaker said that he had about 30 hives in and about his orchard, and it bore heavily last year, which was not a good fruit year in Vermont.

—*Successful Farming*.

Stray Straws

DR. C. C. MILLER, Marengo, Ill.

REV. L. P. HOLMES writes that he also had a live drone from a queen-cell. It was in 1908, the cell was extra large and fine, he caged it, and after the usual 24 days a drone of ordinary size emerged. Last year he had a queen-cell caged, and several days after it should have hatched he opened the cell, finding a fully developed queen, dead, with its head toward the bottom of the cell.

THE BUMBLE-BEE seems in danger of being thrown out of its job as a pollinator of red clover. The *Country Gentleman* reports an invention said to do the work better than the bumble-bee. It consists of a huge brush with about 200 vulcanized-rubber tips to the square inch, which is driven over the clover-field, carrying the pollen from one blossom and depositing it upon another.

TO GET HONEY out of cappings, put them to drain in a container with holes in the bottom; when they will no longer drain, put them in a damp cellar, where they will attract moisture, and the thin honey will drain out to be used for vinegar or bee-feed. Or, instead of taking them into the cellar, put them outdoors in a long box with one end raised, and turn the box end for end as often as the bees dig the cappings down level.

LARVÆ. Nearly had a fit the other day on learning that this word should be pronounced *lar-vee* when all my life I've been saying *lar-vay*. I refrain from adding that it may be also called *lar-way*, lest it throw most of the readers of GLEANINGS into fits. [The pronunciation here will depend on whether one uses the Roman (or continental) pronunciation for Latin words, or English. When we were taking Latin at school we had the English pronunciation, and the final syllable of *larvæ* would have the long sound of *e*. Later on in college, we had the Roman pronunciation; then the same final syllable would have the long sound of *a*. Either way is right.—ED.]

SAMUEL SIMMINS thinks beekeeping in this country has retrograded on account of the use of so shallow a frame as the Langstroth. He says, *Canadian Bee Journal*, 10, "Editor E. R. Root states that the average yields, taking the United States all over, would probably be 35 lbs. of comb honey, or 75 lbs. of extracted. Has bee culture so degenerated that even to-day the results from the old let-'em-alone style of beekeeping can not be exceeded?" But where is the degeneration shown, friend Simmins? You don't for a minute think that the old let-'em-alone style yielded 35 lbs. of comb per colony, do you? Although there are still enough let-'em-alones mixed with the up-to-dates to bring the average down to 35, that average is probably better than it ever was before. [If our friend Samuel Simmins

were more familiar with conditions as they are in the United States he would not make such statements. For instance, he says our Langstroth frame is responsible for two-thirds of our winter losses. When expert beekeepers all over the United States and Canada using Langstroth frames do not lose during winter to exceed five per cent of their bees, and usually not over two per cent, the Langstroth frame, we may conclude, is doing pretty well. It could hardly do better. Some of the former advocates of deep frames for winter are now using Langstroth frames. See reply to F. P. Clare, p. 179.—ED.]

D. M. MACDONALD, *British B. J.*, p. 514, concludes that I give hybrids a bad reputation because I practically say that nine-tenths of the weaklings are hybrids. My good friend, however bad hybrids may be, that statement doesn't charge them with badness. Nine-tenths of the weaklings are hybrids, and so are nine-tenths of the *stronglings*, because nine-tenths of all the bees are hybrids. See? Allee samee, the average hybrid is inferior to the Italian—in my opinion. You ask why, for 50 years, I clung to such bad bees. I didn't—not to *average* hybrids. I bred up a strain of hybrids that were better than Italians. More fool I. If I had stuck to pure Italians I might have had still better bees.

G. M. DOOLITTLE thinks no need to have bees closer than two or three miles from pasture. Out west, if I remember, the authorities advise that in orchard regions bees should be not more than a mile apart, so they need travel only half a mile or so. Likely both are right. In hot weather bees can go two miles just as well as half a mile to gather honey; while in the cool and catchy weather during fruit bloom half a mile may be enough. Yes, I once thought two miles apart was well enough for orchards. But I'm older now. [This is a question of locality. Where bees can fly from a hill over a wide valley, so as not to encounter woods, they go much further than over perfectly level country. We have traveled over a very large portion of the United States where bees are kept, and wherever we have gone we have asked the question, "How far do bees fly?" For level country the general response is, "Not more than a mile and a half; usually not over a mile." While their bees will, of course, fly further, the claim is made that they do not work to advantage. In hilly country, such as we find in New York, bees will sometimes fly five miles to gather buckwheat honey. This has been demonstrated very conclusively at the Alexander apiary, at Delanson, N. Y., and in other places in that State where we have traveled; but we think that in most places in New York bees will not go much over a mile and a half to advantage.—ED.]

SIFTINGS

J. E. CRANE, Middlebury, Vt.

It is interesting to read Doolittle's views of the long and short haul of honey by the bees. It is certainly comforting to think that our bees can reach flowers five miles away; but I have a suspicion that not a little depends on the bees. Now and then we find a colony gathering when others are not showing they can go further or search closer.



I was interested in Mr. Mollett's description of wintering bees in the South. Fifty to seventy-five pounds per hive! Why, it almost takes away one's breath to think of a colony consuming that much. But then I congratulate myself that, if our bees of the North are not at work during our long winters, they are not consuming honey beyond all reason.



We are under obligations to the editor of GLEANINGS for the careful experiments which were made for the purpose of determining the amount of wax used by bees in drawing out a sheet of foundation into a full comb, page 711, Dec. 1, 1911. According to these figures, furnishing an eight-frame hive with full sheets of foundation would save the bees the necessity of making one pound of wax that would doubtless take twelve pounds of honey to produce. This, at ten cents, would be worth \$1.20, or twice what the foundation costs; and yet some beekeepers think they can not afford it.



As to the question whether buckwheat yields honey only during the night or at certain times of the day, or all the time, I believe that it does about as it has a mind to, acting quite differently sometimes from other times. Where I lived in 1867 there was an unusual amount of buckwheat sown that spring, and not a large number of bees kept; and I noticed that, at the beginning of the season, the buckwheat yielded nearly all of its honey in the forenoon; but later in the season the flow of nectar was later in the day, until at its close the flow was almost entirely confined to the afternoon. Now, I doubt not that there are some places where it yields all day, and I am quite sure there are some places and seasons where it doesn't yield enough to be worth mentioning.



Dr. Miller refers to me, page 36, as saying that moths do lay eggs in sections after taking them from hives. Let me say here, to prevent misunderstanding, that our experience has been that moths do not lay eggs in our sections after they are taken from the hives, because the sections are stored where the moths can not get to them; but I always find more or less *larvæ* of the wax moth developing on combs of section honey after they are taken from the hive. If the combs are white and clean, little harm is done; but if any cells of pollen are found,

or the combs badly soiled or "travel-stained," these "varmints" will develop and do lots of harm unless treated to the fumes of sulphur.

The same seems to be true of extracting-combs until they have been frozen so as to kill all eggs or *larvæ* of the waxmoth. Where do the eggs of the wax moth come from if no eggs are laid by the moths after the combs are taken from the hives? Moses Quinby gave it as his opinion, after very careful experiments, that the moths lay the eggs at the entrances of the hives, and the bees carry them in on their legs or bodies, and scatter them over the combs. Those hatching inside the hives are, as a rule, in every strong colony, quickly taken care of by the bees; but when the combs are removed they develop. If I remember rightly, Mr. Quinby took off boxes of honey, and watched to see that no moth entered; and when every bee had gone out of the box it was sealed so no moth could enter; but if kept in a warm place the larva of the wax moth would develop just the same as when exposed to moths.



The recent articles by John N. Lovell, on flowers, are of more than usual value. Somewhere I have seen the statement that Christ, whose life and teachings have attracted so much of the world's thought during the past eighteen centuries, was the first to call the attention of mankind to the beauty of flowers. I can not vouch for the truthfulness of the statement; but one thing is certain—he was a great lover of flowers. Indeed, I think we may say that he was a child of nature, with the hills and valleys, the fields and flowers his teachers. "Consider the lilies, how they grow," is as much a command of Jesus as any other, and if it is our duty to consider the lilies, we may infer that it is also our duty to consider the sweet peas and morning-glories, the apple blossoms and wild asters, and a thousand other objects of beauty on every side of us, too numerous to mention. I have read in an old book of the servant of a prophet who, one morning, was frightened almost out of his wits because he saw a few soldiers encamped on the outskirts of the town, and his master prayed that his eyes might be opened, and they were opened, and he saw more wonderful sights than he had ever dreamed of; and so when our eyes are opened to the beauties and wonders of all about us we shall find more to enjoy and entertain us in our leisure hours than we could ever have believed in our wildest dreams. It is thought a good sign that people are going back from the city to the land, and I am sure it is a good thing when those with literary ability write of nature and all its wonders rather than myths and impossible creatures. There is enough of the real and true to satisfy any sound mind.

Beekeeping in the Southwest

LOUIS SCHOLL, New Braunfels, Texas

BEE CULTURE AND AGRICULTURE; SHOWING THE MUTUAL INTERESTS OF BEEKEEPER, FRUITGROWER, AND FARMER

Outside of the beekeeping world it is not generally known nor even understood that honeybees were created, not so much for the purpose of furnishing the delicious honey for mankind, as for carrying pollen grains from one flower to another, so that these may bear fruit and seeds. The pollen is gathered by the bees from the flowers, and carried to the hives in little bright-colored pellets on their hind legs, which many persons suppose is the wax from which the combs are built. The bees, however, must gather this yellow dust or pollen from the flowers, to prepare the partly digested food for their young larvæ. This is absolutely necessary; and if they are unable to secure a sufficient amount of pollen the progress of the colony is delayed considerably. In gathering either pollen or honey the bees come in contact with the pollen grains of the blossoms, which adhere to their hairy bodies, and are thus carried from one flower to another. These pollen grains thus come in touch with the stigma, or the female part, so to speak, of the next blossoms visited. Cross-pollination is thereby assured, and the thorough setting of fruits and seeds the result.

Bees are most important distributors of pollen, because they appear in larger numbers than other insects, and especially in the early part of the season. It is this reason, as well as their greater activity, that makes them more useful in this great work they help to perform, the value of which, as estimated by good authorities, is far greater to our country than the value of the honey crops. It is certain that the bees, on account of their greater numbers, visit a far greater number of blossoms, and do this work more thoroughly than other insects.



THE SEX IN PLANT LIFE

Sex in plants or flowers exists very much as in animals, and it is just as necessary that fertilization take place before fruit or seeds develop. In many plants the male and female exist in the same flower. In others the male is found in one and the female in another flower of the same plant, while in still others each sex is found in the flowers on separate plants entirely. No matter what the arrangement, however, it is necessary that the pollen grains from the anthers of the male part of one blossom reach the stigma of the female part of another. The pollen grains of one blossom ripen earlier or later than the stigmas, so that self-fertilization is prevented, and the bees carrying the pollen to the other blossoms in the right stage to receive it effect and complete the fertilization, after which the de-

velopment of fruit and seed follows. Without this pollination the blossoms would wither and die instead of bearing fruit.



SOME STRIKING EXAMPLES

During the most favorable weather conditions the pollen grains may be blown about by the wind, and pollination of the blossoms take place so that fruit may be borne. But even under such conditions the bees play a great part in making the work more thorough, as they visit many flowers and blossoms that may not be reached by pollen driven by the wind. It is well known that such ideal weather conditions do not always exist; and during such conditions, when the weather is damp and the pollen sticky, the wind does not blow it about so easily, and it is then that the insects, and especially the bees in their large numbers, play the most important part in the crop of fruit and seeds that will be harvested. Where certain varieties of plants or fruit trees are isolated from others of their kind, and when there is a great distance between them, the chances of pollination are not certain, and the bees must be depended upon to carry the pollen from one to another. Where bees are not present, and the wind only depended upon, there are instances on record of trees that bore no fruit on the windward side, but an abundance on the other side. The presence of bees would have insured the pollination of the blossoms on the windward side, and a better setting of fruit on all parts of the tree.



DO BEES PUNCTURE FRUIT?

It has often been stated that our bees puncture fruit; but numerous experiments show that this conclusion is ungrounded, their mouth parts being so constructed that they can not break the skin of any kind of fruit. They appear only after birds or insects have caused the skin to break, and then only to gather the sweet juices from the bruised fruit. Many experiments in which sound fruits were hung in hives of bees have proved absolutely that the bees can not puncture the skin of sound fruit, even if they are starving for want of food.



POISON-SPRAYS AND BEES

As the insect depredations are becoming more and more harmful to various crops, man must protect himself against these insect pests or bear considerable loss. For this reason spraying is being practiced more generally. The thinking person will not kill his best friends, the bees, by spraying during bloom, for the greatest authorities have shown that it is not only unnecessary but dangerous. In many States there are stringent laws against spraying during fruit bloom.

BEEKEEPING IN CALIFORNIA

P. C. CHADWICK, Redlands, Cal.

The problem confronting us in Southern California is not how to keep more bees, but how to keep what we have until a season of more bountiful rainfall.

The report of the Northern California Beekeepers' Association, by W. A. H. Gilstrap, has the true ring and the "get together" spirit, which I hope will do much toward the building of a great harmonious State association that will enable us to do something besides "resolve."

In behalf of our retiring President, Mr. B. G. Burdick, I am going to extend a vote of thanks for the State association, this matter having been overlooked in the rush at the close of the session. Mr. Burdick wielded the gavel, so far as I know, to the satisfaction of all.

The gentleman who accompanied the State demonstration train (I did not learn his name) said before the State association that European foul brood (black brood) could be cured with any kind of bees provided the colonies were strong enough. In this I believe he is badly mistaken. No doubt strength is a great factor, but in itself it is not sufficient.

Northern and Central California will probably produce much more honey this year than the southern part of the State. Indeed, it is quite possible that, before many years, there will be a thinning of ranks in our Southland for more desirable locations over the ridge. The seasons here are much like the little girl who had a little curl in the middle of her forehead—"when they are good they are very, very good; and when they are bad they are *horrid*."

February has passed without a drop of rain; the usual pollen-bearing spring flowers did not germinate nor dry up when small, for the earth is as dry now as it was last midsummer. Spring breeding in many places is almost at a standstill, and the outlook even for orange honey is the most gloomy of any time for nearly ten years. Optimists say we shall have rain yet; but we have had this false hope so long that my mind is very much akin to that of the man from Missouri, who had to be shown.

HOW EDUCATION AFFECTS THE DEMAND FOR HONEY.

The people of Texas have been fed on bulk comb honey until they now demand it. Colorado seems to have fed on section honey, while out here we have taught them to eat extracted, and the quantity consumed is wonderful. One grocery in this city sells an amount running into tons each year. Beekeepers sell many five-gallon cans to

families, nearly all of whom return their cans to be refilled the following season. One enterprising young man put some bulk comb on the local market two years ago, giving his entire supply to one grocer to dispose of, and a demand was created that was hard to fill. The young man has since left the city; but the demand for his ware remains at that store. A majority of people call extracted honey "strained honey," and believe it is squeezed out through a cloth. If this one false idea could be overcome it would add much to the demand for this product. People follow their education pretty closely, whether it be social, religious, or on other lines. Many, no doubt, remember the time when grandma or grandpa "robbed" the old "gum," carried in a quantity of honey, "bee bread" (and likely some brood), and really strained it. Is it any wonder the idea is hard to overcome?

DRASTIC COUNTY ORDINANCES.

Ventura County has passed an ordinance that "all bees not bearing an inspector's certificate will be destroyed on arrival," while Imperial County Board says no more bees shall be brought into that county. It is rather laughable to read how some of our county boards are going to block the avenues of trade or kill it when it arrives. Personally, I think these county boards are well-meaning gentlemen, but poorly advised. Not a great while ago some one persuaded the city trustees (of Redlands) to pass an ordinance prohibiting any person from keeping more than five colonies of bees in the city limits. The ordinance was attacked in the superior court, and defeated. There is little doubt, in my mind, that such county ordinances as mentioned above would meet the same fate if taken into courts, for these reasons: One county can not legislate against another. Such regulation comes under State jurisdiction, while no court would allow the destruction of healthy bees any sooner than it would domestic animals. If every county in the State should pass an ordinance identical with that of Imperial County, there would soon be a condition that would be intolerable. Migratory beekeeping is a part of our modern-day progress—has come to stay, and can not be stopped by a few county boards. Such drastic ordinances, in my opinion, will hasten the day when we shall have a State law that will be effective without trying to prevent free movement, or the destruction of healthy bees, for the very good reason that these same counties want protection, and will back a good State law solidly when they meet defeat in what they have. I am not opposing quarantine laws by any means; they are becoming indispensable; but I am opposing those things that are neither good law nor common sense.

Conversations with Doolittle

At Borodino, New York

OVERSTOCKING A LOCALITY.

"I have fifty colonies of bees and desire to increase to as many as my locality will support. Then, if I see my way clear, I may start some out-apiaries. Now, what I want to know is, about how many colonies I can profitably keep in one place. I have asked several beekeepers about this, and I find a great diversity of opinion. Some tell me that fifty is enough, as it takes more than two-thirds of the nectar in most fields to sustain the colonies during the year. Others say that Mr. Alexander kept 700 colonies in one apiary and got splendid returns from them. What is your opinion?"

"Overstocking a locality is a subject which has puzzled many a beekeeper; and deciding upon the number of colonies of bees that may be kept profitably in one locality is difficult, even for one who has given much thought to this subject. If I am right, Dr. Miller has said somewhere that there is a limit beyond which one can not profitably increase the number of colonies in an apiary; but just where that limit is, can, perhaps, never be learned. He said that, if he were obliged to make a guess, he would think about eighty colonies in one apiary would be the limit of his location. You will note that he was talking about *his* locality, which may be better than the one you are in, or it may not be as good. Therefore a knowledge of the locality one is in is one of the important factors which must be taken into consideration.

Then, again, the seasons are so unlike in different localities that it will never be possible to do much more than to estimate approximately the number of colonies that may be profitably kept in a certain location. It will also become apparent to all that a different approximation must be made for each locality.

"Mr. Alexander was in a most propitious locality—one in which there were thousands of acres of buckwheat sown every year. This, in addition to clover and basswood, gave something which every beekeeper would thoroughly enjoy. But Mr. Alexander did not decide that 700 colonies was about the right number for him to keep, without years of experience in and with his field. Therefore *experience* comes in as a very important factor, and that experience must cover several years in any given locality before any thing like a correct estimate of how many colonies can be profitably kept can be made.

"Still another factor which must be taken into consideration is the stability of the field. When I first began keeping bees, there were great forests in sight of the apiary in every direction, and many of the trees were basswood, some of them four to five feet across at the stump, and eighty feet tall, with great spreading branches. Basswood lumber of the best quality could be

purchased then for \$8.00 a thousand feet, and at that price there was little incentive to cut these trees, save those dying of old age. But in the years since then, the price of such lumber has gone to \$12, \$20, \$25, \$30, and now to \$35. The result has been the denuding of these forests until very few basswoods remain except in gullies and other out-of-the-way places where it is almost impossible to get logs. In former years there was no failure in nectar from this source, so that, in three seasons out of four, during the blossoming of our basswood, 400 colonies set down here could not begin to collect the nectar. But now this is all changed, and a good crop of basswood honey from one-fourth that number is the exception rather than the rule. In fact, if mustard, white and alsike clover, and buckwheat had not materially increased in this locality during the past fifteen years, beekeeping would be no longer profitable, where for twenty years in succession my average yield of section honey was 85 pounds per colony. With the prices at from 22 to 28 cents a pound for section honey, apiculture was very profitable in those days when basswood forests surrounded many of the apiaries in this State.

"In deciding this question of overstocking the home apiary to an extent sufficient for dividing the number and taking part of the colonies to a different locality, allow me to suggest that it costs more to manage bees away from home than it does in a beeyard near your back door. The average yield of the home apiary might be cut down considerably from the increase of numbers before it would be profitable to start an out-apiary in some locality from five to ten miles distant. An out-apiary requires the purchase of a team, automobile, or some means of conveyance for use in going to and fro, as well as a change of methods, non-swarming and other systems, all of which bring added expense. But after once starting in the out-apiary business, the establishing of one or more additional apiaries is not such an expensive affair as was that of the first one, for all of the things necessary for the first can be used in any of the apiaries subsequently started."

How Bumblebees Puncture the Nectaries of Bean-blossoms

When my broad beans began to bloom I noticed that the bumblebees were always around; yet in the majority of cases the blossoms failed to set. I then noticed a hole at the base of the flower like that made with a pin, and this hole was not found in the newly opened buds. One day while wondering about this I saw one of the bumblebees, of which there are several kinds, go to a flower and deliberately eat a hole and then extract the honey as if it had been at the job for years. So it missed the pollen.

Westley, B. C., Oct. 4.

H. G. SLATER.

General Correspondence

BEES IN RELATION TO HORTICULTURE

BY H. HARLEY SELWYN

That the honeybee (*Aphis mellifica*) forms an important link in successful agriculture is now very generally recognized. The large annual production of honey and wax due to the industry of these insects is of very considerable economic importance; but in addition they probably play almost as important a part in materially increasing the yield and quality of the various fruits in the orchards and gardens scattered throughout the land.

That bees are intended by nature to aid in the pollination of flowers, there is no doubt, as the pollen and nectar secreted by the flowers are both absolutely essential to the life of bees, and consequently they are eagerly sought for by them. It is true that other insects, as well as atmospheric conditions, aid in this work of pollination to a considerable extent; but these other insects are comparatively few in number during the earlier part of the season, and, besides, they appear to visit the flowers only for the nectar which they contain, whereas the bees are in search of both pollen and nectar; and at the time when the orchards are in bloom the requirements of the hive, on account of the many thousands of young larvae therein, require large quantities of pollen. For this reason, if climatic conditions should be unfavorable for the secretion of nectar, the bees would, nevertheless, visit the blossoms in order to gather the pollen which is so necessary, and in so doing accomplish the end in view, namely, that of transferring particles of pollen from one flower to another, or from the stamens to the pistils of individual flowers, and thus bring about their proper fertilization.

IF THE BEES ARE KEPT AWAY NO FRUIT WILL SET

Numerous experiments have proved conclusively that comparatively little fruit will set if fertilization depends solely upon the carrying of the pollen by the wind and other minor agencies. In proof of this it has been recorded that two trees of the same kind, both heavily laden with bloom, were selected, the one being protected with cheesecloth and the other left uncovered, with the result that the former set practically no fruit, while the one left accessible to the bees, of which there were large numbers in the vicinity, owing to the proximity of an apiary, bore an abundant crop. This is but one of the many striking examples which might be cited to show the importance of bees in relation to horticulture.

There are, it is true, seasons when fruit trees of all kinds are so heavily laden with bloom, and the weather conditions are so ideal for pollination, that, even with the ordinary agencies, sufficient fruit is set to in-

sure good crops. Unfortunately there is also the reverse side of the question when the period of fruit bloom is accompanied by dull, cloudy, and possibly wet weather, with but scant periods of sunshine. At such a time the farmer or fruitgrower who is fortunate enough to have a large apiary in or near his orchard will surely benefit greatly, as, even if there are only a few hours of sunshine each day, tens of thousands of bees will visit the blossoms during that period and effect the necessary fertilization which otherwise, owing to unfavorable conditions, might and probably would not have taken place. It would be very difficult to say just how many colonies are required to the average acre, whether it be trees or flowers that the bees are forced to visit; but it is safe to say that most localities are never overstocked with these very necessary insects. In fact, it is generally the reverse; and as a result there are undoubtedly many tons of honey going to waste annually for the lack of gathering, not to mention the hosts of plants that never succeed in accomplishing that most necessary function, namely, the proper development of the seed ovary, and consequently do not reproduce their species to nearly the extent that nature intended.

SPRAYING DURING FRUIT-BLOOM INJURIOUS

So much has been said and written on the subject of spraying and its important relation or effect on bees that it is hard to deal with the subject in other than a general way in an article of this nature; but perhaps a general resumé of the main points would be of interest.

The question of poisonous solutions used in spraying to combat the many injurious insects and fungi peculiar to fruit trees and bushes of all kinds, and the proper time for their application in one which is worthy of careful attention, especially in view of the fact that spraying is now being advocated as the one and only means of insuring the production of perfect fruit. It might be expected that the individual who owns an orchard, even though it be a small one, and who has become sufficiently familiar with up-to-date methods to practice spraying, would realize the injurious effects such spraying will have on any bees in the neighborhood if this work is done during the period of fruit bloom, and, consequently, would refrain from making the applications at so critical a period; but, unfortunately to relate, there are still far too many occurrences of this nature as the seasons come around, notwithstanding the efforts of the numerous beekeepers' associations to enlighten these misinformed individuals.

BEEKEEPING AT EXPERIMENT STATIONS

That the importance of beekeeping is becoming more and more generally recognized in the United States and Canada is evi-

denced by the fact that specialists are being employed and apiaries established in connection with the various agricultural colleges and experiment stations of both countries. It is to be hoped that, by this means, in addition to the mass of useful information on the subject contained in the leading apicultural journals of the present day, this important branch of agriculture will make rapid strides in the future. Notwithstanding the educational opportunities on the subject and the improved methods now available, there will probably always be a large number of beekeepers who will continue to keep their bees in a haphazard way—that is, in the old box hive or any other receptacle handy. It is, however, an ill wind that blows nobody good, as the saying goes, for the rapid spread of American and especially European foul brood may perhaps, in the end, prove to be a blessing in disguise, inasmuch as it is almost sure to put out of business thousands of these so-called “beekeepers” who in reality do more harm than good in the neighborhood, as their bees are too few in number to be of very material assistance, but at the same time capable of transmitting the honey containing the germs of these malignant diseases.

Ottawa, Ont., Can.

BEES CAN NOT INJURE SOUND FRUIT

How to Prevent Grapes from Being Punctured by other Insects and Birds

BY PROF. H. A. SURFACE

[A copy of the following letter by Prof. Surface, in answer to a correspondent, was sent to GLEANINGS. We regard it as a most convincing statement; and coming from such a recognized authority we are glad to place it before our readers, withholding the name of the original inquirer.—ED.]

Replying to your letter asking if there is any practical means of preventing bees from destroying grapes, I beg to say that the bees themselves do not attack the grapes excepting when the grapes themselves are overripe or have been punctured by other kinds of insects, such as wasps and yellow-jackets, or by birds, when they have been diseased by disease germs, which would eat their way through the skin of the grape. It is impossible for bees to make holes in grapes that have not been previously damaged in some way. I have tried this again and again. After the holes are once made the bees suck the grapes dry. This really is a benefit to the grapegrower, because it prevents his packing in his shipping packages a lot of grapes that were damaged, and, therefore, would be sure to sour and start decay in the cluster, and spoil the package.

However, what you need is information as to the method of preventing the grapes from being injured by the original depredators. The most effective means of doing this on a limited scale is by bagging in paper bags. You can buy two-pound paper bags by the thousand or ten thousand at a low price. A woman can place hundreds of

them around the clusters in a day. Fasten them with a pin at the base of the entire cluster of grapes. This should be done just after the blossoms fall, or before the grape berry becomes the full size of a buckshot. This will not only prevent damage as they become ripe, but will prevent injury by the curculio, the grapeberry moth, disease germs, etc., and will give you fruit that will justify it.

If you were an experienced grapegrower you would not need to be asking for information as to how to prevent injury from them, because, in the great grape belts, this is handled by spraying; and there, where the production is by many tons per year, the proper thing to do is to spray the fruit and vines several times during the season with the Bordeaux mixture and arsenate of lead. Use the regular formula of Bordeaux mixture, of three pounds of bluestone and four pounds of lime in fifty gallons of water, and add to this two or three pounds of arsenate of lead. Make the first spraying just after the buds burst in the spring, the next spraying after the blossoms drop, and about the time the bags would be put on if you were going to bag instead of spray. The next spraying should be about three weeks after this, and again should be repeated in three or four weeks for two or three intervals.

If you are not a commercial grape-grower, the bagging will be found cheaper and more satisfactory than the spraying, because a man who does not understand thoroughly extensive spraying, will not, as a rule, do it properly. If you are an extensive grape-grower, but do not live in a region of large commercial growing of this fruit, I would by all means advise you to go during the proper season right into the grape belt as near to Northeast, in Erie County, as possible, and see for yourself just the methods of cultivation and spraying that are there practiced most successfully. The kinds of apparatus that are used, the methods of trimming and cultivating the vines, methods of making and applying the spray liquid, all are better learned on the ground where this is being done extensively than by any other means. In that region we never hear any thing of damage to grapes by bees, because they gather their grapes and market them at the proper time, which is before they are bursting with dead-ripeness. They also spray, and cause the skin of the fruit to be healthy, and thus there are no holes by disease germs where the bees find entrance.

You mention larger, stronger, and later foliage having been made on the vines during the past two years by the use of nitrate of soda. This is, no doubt, due to the nitrate, as I have seen such results on almost all plants where it is used. From 150 to 200 pounds per acre is the amount generally used on trees, vines, and, in fact, almost all forms of vegetation. It should be applied when growth starts in the spring, and again in about a month, but not continued after the early summer.

PROF. A. J. COOK, HORTICULTURAL COMMISSIONER OF CALIFORNIA

Something of the Life History and Doings of the Man who has been Asked by the Governor of California to Step up Higher

BY E. R. ROOT

For three or four issues back I have been telling something about the lives of eminent beekeepers who have ended their labors in this world, and who have gone to the great beyond. In this issue I have a more pleasing task—that of saying something about the life-work of a man who is still in the flesh, and who, it is to be hoped, will be with us many years to come. I refer to none other than Prof. Albert J. Cook, who has just been appointed Horticultural Commissioner of California. He needs no introduction to our older readers, for his contributions have graced these columns for many years.

For twenty-seven years Professor Cook was instructor and Professor of Entomology and Zoology in the Michigan Agricultural College. During the latter part of 1893 he was called to take a similar position at Pomona College, Claremont, Cal., where he has labored for 17 years more. By the way, long service anywhere always speaks well for any man.

During the latter part of last fall the California papers announced that Professor Cook, of Pomona College, was about to be promoted again—to receive the appointment of State Commissioner of Horticulture under Governor Johnson. Later on this appointment was duly confirmed. The Governor, in explanation, says he appointed Cook "solely upon his merits," and that "his position is one of the most important offices in the State." And as one of his collaborators has well said, "this is the crowning event in Professor Cook's remarkable career."

No other man in the State nor in the country at large could bring to this particular work more clean-cut and indubitable fitness than Professor Cook."

Professor Cook will have placed at his disposal \$100,000 to carry on the work in his department, and the responsibility of appointing capable men to assist him is considerable, as the Governor says. When we consider the fact that California probably produces more fruit than any other State in the Union, and is destined to go still further, and that the keeping of bees is one of the big industries of the State, this appointment looms up large. Indeed, we doubt if there is another commissioner of horticulture in all the United States who has a larger field of work than our own Professor Cook. I say "our own," because he has been so closely identified with the beekeeping interests of the country. Himself the author of one of the most widely sold bee books, "The Beekeeper's Guide," a prolific writer for the bee journals, a number of times president of the North American and National

Beekeepers' Association—well, we have a right to claim him, as much as have the horticulturists of the country.

I think it is fair to say that Prof. Cook is distinguished, not so much for the great things he may have discovered in science (and he has done his share), but rather because he has been a great teacher. Hundreds of his students, some of whom have made their mark in the world, bear testimony to what he has done for them. He is loved and admired by his fellow-professors, and adored by his students, both at the Michigan Agricultural College and Pomona

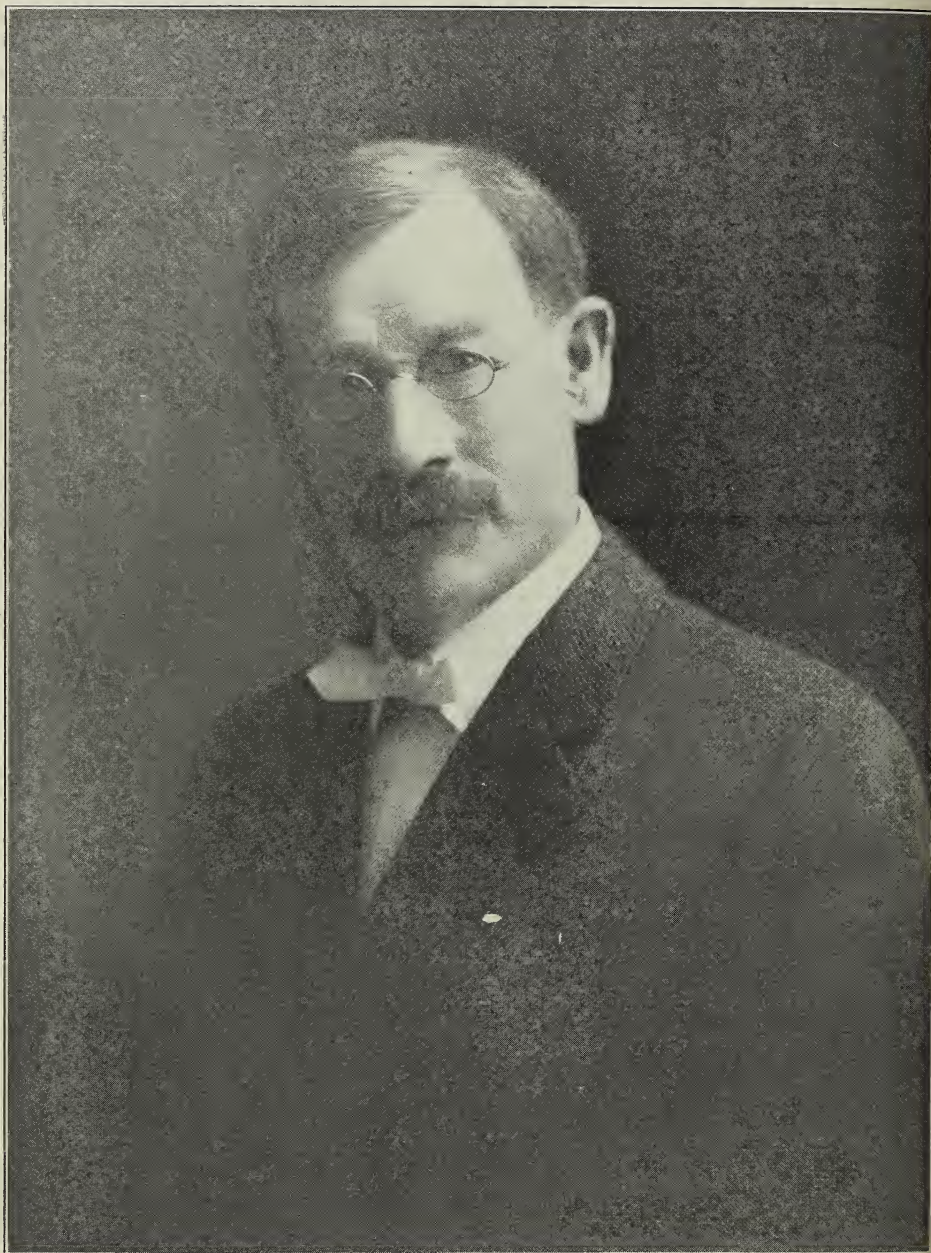


Professor A. J. Cook as he appeared when he was conducting his experiments in bee culture at the Michigan Agricultural College.

College. The Pomona College paper, just received, is full of expressions of love and regret that he is to leave. I make just one extract:

The loss to Pomona College will be felt most keenly by all of the students who have known Professor Cook personally. His genial nature, his great heart, his tremendous and infectious enthusiasm, his keen interest in the personal welfare of every student under him—these things have made him greatly beloved by all. His interest in his students has never, through all the years, been a perfunctory one, but always a living, active interest, that went right out and fought for them; an interest that not only helped them to find their life work and get into it, whatever it might be, but ever afterward supported and encouraged them to great efforts. In a quiet way, unknown to the public, he has even financially assisted deserving students to complete their work, and for this he has been repaid in some things beyond the value of money—loyalty and love.

An indefatigable worker himself, he has the rare faculty of inspiring his students, and all those with whom he comes in contact, with his own habits of industry, zeal,



PROF. ALBERT J. COOK AS HORTICULTURAL COMMISSIONER OF CALIFORNIA.

and enthusiasm. His style of writing is natural and easy as well as fluent. As a lecturer he has few equals.

But Professor Cook is an original investigator. He has done much, both at the Michigan Agricultural College and Pomona College, to advance the cause of bee culture,

fruit culture, and horticulture in general. As a professor of Entomology in the Michigan Agricultural College he conducted a long series of experiments showing the very important and intimate relation between the bees and fruit. He had a number of the fruit-trees at the Agricultural College, just

as they were coming into bloom, covered with mosquito-netting. Some particular limbs were covered, while others were left to the visitation of bees and other insects. All of these experiments, showing conclusively the valuable work of the bees in pollinating fruit-blossoms when no other insects could or would be present, were published in the bee journals at the time, and, later on, were incorporated in more permanent form in the A B C and X Y Z of Bee Culture under the head of "Fruit-blossoms," and also under the head of "Pollen." While other investigators had done something similar to this, Professor Cook conducted his experiments on such an elaborate scale that he practically settled the matter for all time to come.

Again, we find him among the first to proclaim that honey is not evaporated nectar, as many had supposed. An elaborate series of experiments were conducted at the Agricultural College under his directions, the result of all which showed that nectar, after it has been gathered by the bees, is transformed or "digested" into a new chemical product known as honey. He also claimed that sugar syrup, if fed *thin* enough, would be transformed also by the bees; and from this arose a sharp controversy at the time, whether it was legitimate to feed bees sugar syrup and have them store it in sections and sell it as "honey." While Professor Cook never contended that it was proper to sell it as honey without stating that it was sugar fed, he maintained that it had the properties of honey, and, if fed thin as nectar, so that the bees could properly invert it, that it was "honey." This stirred up a "bees' nest" among the fraternity at large, and the stings that were jabbed into Professor Cook at the time were something fierce. While scientific men, including Dr. Wiley, admitted that there was a decided chemical change from nectar into honey, and that thin sugar syrup fed slowly to bees took on the properties of honey, they contended that the product *was not honey*, because the nectar of flowers has certain properties, including volatile oils, that are not found in sugar. The whole fraternity seemed to feel that the dogma of sugar honey was too dangerous to let go unchallenged, and the matter was dropped; but no one could or should question the honesty or sincerity of Professor Cook or those who stood with him on the proposition.

Professor Cook also took the ground that, as honey was a predigested food, it could be eaten by children and certain invalids, when cane sugars would do harm. In this, Professor Cook seems to have had considerable support, although there are some food experts who take no stock in this teaching. It is nevertheless true that not a few medical men are beginning to recommend honey in their dietaries; and recent issues of GLEANINGS have reported how honey is being given to convalescents at hospitals.

Whether Professor Cook is or has been always right on these propositions, I can not say; but I have always noticed that, when

some pioneers of science attempt to enunciate a new theory or truth, he often meets a storm of opposition. Galileo was pronounced a heretic, and put in prison for saying what we all acknowledge as an unquestioned fact. There have been many Galileos since, and there will be more to follow.

Later on, Professor Cook took an active interest in spraying fruit-trees to destroy injurious insects and fungi. Indeed, in the language of another, "the remedies he first recommended are now common; and he was probably the first to demonstrate the efficacy and safety of Paris green for the codling moth."

Again, we find that Professor Cook was one of the first to point out the danger to the bees and to the beekeeper from spraying trees while in bloom. He showed that spraying at such times is destructive to bees, and wholly unnecessary if not harmful from the standpoint of the fruitgrower. Later on we find him in the forefront advocating measures for the suppression of bee diseases, and Michigan was one of the first States in the Union to have a foul brood law. During all this time he was teaching entomology and zoölogy, and going around lecturing at farmers' institutes, telling the farmers how to grow more and better crops. After going to California he continued his active interest in bees, devoting himself assiduously to the work of his department.

During the last four or five years his writings have not appeared in the columns of our bee journals; for he remembered he was approaching a time in life when he could not work night and day as he had done in his early career. But I find that, according to the college paper published at Pomona, he did much "to place his department in the college on the most efficient-working basis; and his services to the general public are warmly acknowledged by grateful men and women throughout the length and breadth of the State. His experiments in agricultural and horticultural matters have for many years been of a very extensive character. Taking all of these things into consideration, Governor Johnson could scarcely have found a man better equipped to undertake the duties of the new office, involving, as it does, an annual appropriation of \$100,000 and a corps of assistants.

Besides all his other qualities, Professor Cook is one of the most lovable Christian men I ever met. I have seen him in conventions, and time and time again he has, with that broad and loving spirit so characteristic of him, poured oil on troubled waters. He was, indeed, a great peace-maker, because he seemed to have the happy faculty of seeing the good in everybody, and of trying to make every one happy. It goes without saying, that Professor Cook will harmonize the apparently conflicting interests of the beekeepers and the fruitgrowers. If he has any thing to say about it (and he will have a good deal) there will be "no strife between me and thee, for we be brethren."



Fig. 1.—Tobacco farm of Fred M. Colton, Granby, Conn.

THE TOBACCO INDUSTRY IN THE CONNECTICUT VALLEY

BY E. H. SHATTUCK

The subject of tobacco honey may sound a little odd, and the average beekeeper in Connecticut who has not investigated the matter thoroughly is a trifle alarmed on finding out that the tobacco plant is being allowed to blossom, and, as a consequence, yield nectar; and many of them feel that it will spoil the flavor of the late summer and fall honey to a certain extent.

It is because of this feeling of unrest among the beekeepers of the Connecticut Valley that this article is penned, in the hope that it will reach, through GLEANINGS, a great number of the fraternity who live in the tobacco section.

During the past few years "syndicates" and well-to-do farmers have begun raising under cloth what is called "shade-grown" tobacco, and also have commenced "picking" the leaves from the outdoor tobacco, so called, in both instances allowing the plant to blossom and mature seed. Until these new methods were adopted all tobacco in the Connecticut Valley was topped, and the "suckers" picked off as they presented themselves, all blossoms thereby being headed off except, perhaps, a few plants in the field which were left to produce seed.

The tobacco plant is self-fertilizing, a large part of the pollen being used by each individual flower. When the grower wishes to have "pure" seed true to name he ties a large paper bag over the young blossoms; and as the stem lengthens out he passes along and pushes the bag upward to give

the flowers room to expand. In this way all insects are kept out, and the result is seed that is an exact counterpart of the parent plant—that is, the offspring is such. One might think that, so long as no insect is needed to fertilize the blossom, the chances of a secretion of nectar would be slim, as nature supplies it abundantly only to those plants that need the help of the bee to carry the pollen from one flower to another; but, as a matter of fact, a great deal of nectar is supplied in right seasons, and it is a help to have the bee visit the flowers to help disseminate the pollen grains; and it doubtless makes stronger and more fertile seed, as that is one of nature's strongest laws. I think the growers will find to their sorrow that the practice of raising seed under the paper bags, if long continued, will tend toward weaker and therefore less hardy and sturdy plants. Does it not sound reasonable? The tobacco expert, who raises "Shade Grown" for the leaf only, does not leave openings for the bees, as it does not matter materially to him. But in spite of all he can do, the fields are so large that numerous openings present themselves to the industrious little insects, so that more or less of the nectar is saved.

Remember the seed from these immense fields of tobacco is not saved. A small piece is arranged for, to cover the needs in this line.

The year 1912 will see hundreds of additional acres devoted to the raising of tobacco by these new methods, in Hartford County alone, as it has proved a very profitable crop, the leaf thus produced selling readily at advancing prices. This gives the beekeeper a new and increasing source of hon-

ey, and at a time of year when a dearth is usually on in this locality. The plant furnishes nectar between the buckwheat flow and the fall flowers, such as goldenrod, asters, etc., and is a heavy yielder in some seasons; but a cool dry summer, such as we have just experienced, stops the flow to a great extent. In 1911 there was very little honey of any kind produced in this locality. In 1910 the bees from my apiary swarmed on the tobacco, some colonies producing 100 pounds of surplus in sections. It will be several years before the value of tobacco honey is fully known; and whether this new source of nectar will eventually help or retard the Connecticut beekeeper, will be a question that will be decided in the near future.

I wish to emphasize especially the statement that our beekeepers have nothing to fear from the nectar of the tobacco plant. All the early section honey is ready to come off the hive before the tobacco commences to yield, and it has been quite the rule in Connecticut to let the fall flow go to the brood nest for winter food, and this new source will fill the bill exactly, helping out largely in seasons when fall flowers fail, or are cut by early frosts. The bees winter finely on the honey; and if any sections are made during this flow they will certainly sell as well as buckwheat, being somewhat lighter in color, and, for many uses, equal to any of the darker grades of honey, if not superior. If for any reason the beekeeper does not wish it to go into sections he can put on extracting supers and handle the product in any way he sees fit.

Connecticut does not boast of many large apiaries, under 20 colonies being the rule in

this locality; but if the tobacco plant continues to be raised and allowed to blossom, many more can be kept to advantage. More colonies have been lost during the winters for lack of supplies than any other one thing, as a good fall flow is the exception rather than the rule. If the new source will fill the brood nest for winter, bees will increase much more rapidly, and give the beekeeper more assurance of success.

Fig. 1 shows outdoor tobacco in full bloom owned by Fred M. Colton, of Granby, Conn. Mr. Colton's tobacco-warehouse for sorting the crop is seen in the distance. About 60 hands are employed in the place during the winter. Fig. 2 presents the tobacco blossoms near at hand. A remarkable thing about the flower is that a bee will disappear in the depths of the flower, and remain perhaps a full minute, and, upon coming out, fly straight home. It can readily be seen that a field of 100 acres or more will keep quite a few bees busy, with such a supply to draw from.

Fig. 3 gives an idea of the tents which are used to produce "shade grown" tobacco. Notice the splendid roadways that lead one through these vast fields, some of them being nearly a mile in length. These roads occur every little way in order that the harvesting may be the more easily carried on. A severe thunderstorm sometimes comes along, ripping the cloth off from hundreds of acres, giving the bees a fine chance to visit the bloom. But the tents are never "bee tight," so that they find a way in if the nectar is to be had.

People who have not visited the large tent plantations that have sprung up as if by magic can not realize the progress the in-



Fig. 2.—Close view of tobacco blossoms. The honey from this source is dark in color, but answers nicely for winter stores.

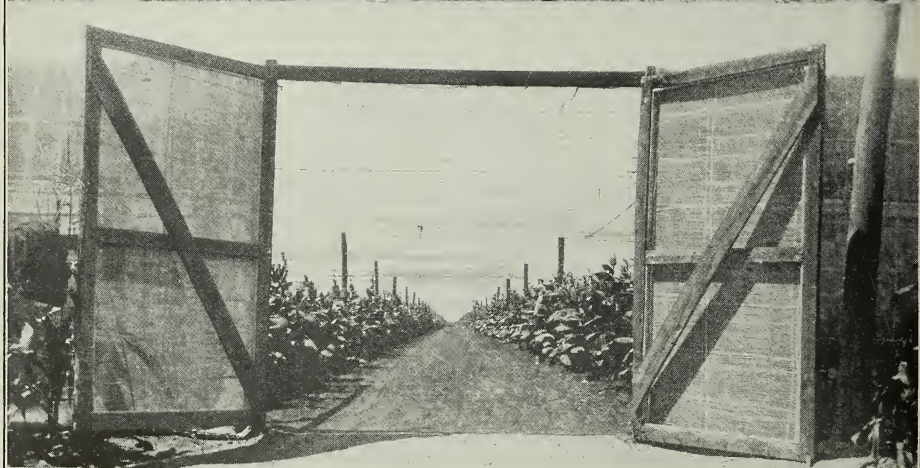


Fig. 3.—Tobacco growing under cloth. Some of these roadways are nearly a mile in length.

dustry is making. I am not a party to the use of tobacco, and would not, if my way were law, promulgate the use of it; but it is here, and the honey part is certainly all right.

Granby, Ct.

HOW FRUIT MAY BE IMPERFECTLY POLLINATED

Spraying Trees in Blossom all Wrong, Even from a Fruitgrower's Standpoint

BY ARTHUR C. MILLER

We beekeepers are very careful not to permit the fruitgrowers to forget the importance of our bees to their business. We are not at all backward about reminding them of the sundry blunders and losses of some of their fellows in driving beekeepers from their vicinity, and then having to beg them to come back. We very diligently rub it in, for it gives us a deal of satisfaction to say "I told you so," and then you know it helps in a whole lot of nice little ways. These orchardists give some of us a nice spot for an apiary, a room or a building for storage, extracting, etc., sometimes do our carting, just so they may be sure of having the blossoms well pollinated.

Then sometimes we forget all about a crop of fruit-bloom honey. "Oh dear! no, we seldom get a crop of honey from apple blooms—perhaps only once in four or five years. Really it would be better for us to put the bees a couple of miles down the road. But as the bees are such a help to you, and you keep a sort of watchful eye over them, we are really very glad to help you out, even if we do get a little less honey."

And after all our pains to oblige and accommodate, some of those chaps every now and then get very skeptical about the usefulness of the bees to him. "Drat the confounded stinging bugs, they are a consarned nuisance. I got all the apples the trees would carry before you brought the pesky things here, and the sooner you take them away the better I'll like it."

Most exceedingly unreasonable, very shortsighted, and so annoying, too, after all the pains to which we have been to educate him to our point of view! Oh! well, he must be talked to again and shown his folly.

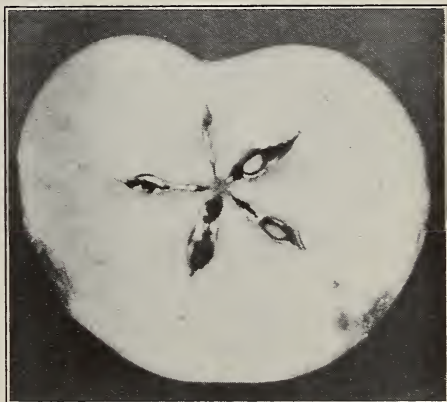
Here is a fine bit of evidence, good enough to convince him or any other fruitgrower. This photograph of an apple, cut horizontally in two, shows four seed vesicles with fertilized and perfect seed, while the fifth contains only the dead and dried ovules which were not fertilized. And the result of such non-fertilization is plainly seen in the surrounding pulp. The apple on that side is flattened. If two or three vesicles were in that condition the apple would be much more deformed; in fact, quite unmarketable.

"Now, sir, that is because the blossom was not fully pollinated. You go to work and plant hundreds and thousands of trees all in one great orchard, and the blossoms are numbered by millions. And, at the

same time, old Dame Nature has not massed the insects to do the work of carrying pollen. It is up to you to help her out; and the only way in which you can do it is to put a lot of bees there."

"The bloomin' bees are in the way when I'm spraying."

"Man, you're crazy to spray when the trees are in bloom. That spray, falling on the very sensitivestigma of the flower, partly or wholly ruins it, so that, even if pollen lodges there, it can do no good. A blossom only partly injured and then pollinated would give just such a sort of apple as shown. Furthermore, you are nowadays so confoundedly thorough in your work that



The result of imperfect pollination. Note the shriveled condition of the upper seed and the depression in the apple on that side.

seldom is there a spot on any tree not reached by your spray. Just do that when the trees are in full bloom, and you will be minus a crop of fruit that season. And here is the proof. One orchardist, spraying after the petals had fallen, came to one tree which, for some reason, was away behind the others, and was still in full bloom. To save himself the trouble of another trip, he sprayed it then, and nearly every little apple dropped off. Of the few which matured, there were not a dozen perfect ones."

We must not let the fruitmen lose sight of these facts. It is our duty to help them avoid loss, misfortune, and disappointment.

And, by the way, that fruit-bloom honey sold like hot cakes, and at a fancy price too—could have sold five times as much. Get after it, boys; it's a good thing.

Providence, R. I.

[As Mr. Miller says, the beeman should help educate the fruitgrower if he is ignorant of some of the fundamentals of his own business; for by so doing he helps his own business. Every beekeeper should know of the important work performed by the bees, for he is almost sure to encounter some small fruitgrower who may jump to the conclusion that bees are a nuisance rather than a benefit.—ED.]



W. C. Murdin, Gladstone, Manitoba, Can., and some of the products of his bee-pollinated melon vines.

HOW TO AVOID SPRING DWINDLING

A Scheme for Helping the Weak Colonies in the Spring to Hold their Own

BY WILL JENSEN

In the spring of 1896, after much loss and many sad experiences in losing weak colonies, I was almost ready to give up. I had tried to be successful by following the experiences of others, and I had read every text book that I knew of that had anything to say about spring dwindling, but still my fine young queens were left with a mere handful of bees in their hives. While I was thinking the matter over, a plan occurred to me one day which I proceeded to try at once.

For every weakling that I had, I got ready an empty comb, a frame containing half a sheet of brood foundation, and a comb of honey. I put the empty comb by the hive wall, the frame with the half sheet of foundation next, and finally the comb of honey. After lacerating that one comb of honey so the bees would be bound to load up, I filled the rest of the hive with empty combs and closed the entrance so that only four bees could come out at once. In ten days I was surprised to see what wonderful progress these weak colonies had made; for on both sides of the foundation there was sealed brood. At this time I lacerated the comb of honey again.

If there is no comb of honey on hand, rip from a 2 x 4, just the length of a frame inside, a piece two inches deep by the width of the topbar; bore this piece full of holes, starting the bit on one of the narrow edges but not boring clear through. Let the holes

be close enough together so that they will overlap. Fasten a half sheet of foundation to the bottom of this trough, and then fasten the whole thing in an empty frame, a bee space from the topbar. Bore a hole through the topbar for a funnel to use in filling the trough with syrup. Place this feeder frame with its foundation beneath between two empty combs in the hive, and always keep the feeder full.

For the last fifteen years I have saved 97 per cent of my weak colonies in the spring by this plan. The point is this: A very small cluster can not keep up the necessary heat if there is a

cold comb dividing it into two parts. Let this handful of bees cluster all together and you will be surprised at the results.

Beeville, Texas.

THE VALUE OF BEES AS POLLINATORS OF MELON BLOSSOMS

BY W. C. MURDIN

To my way of thinking, gardening and beekeeping should always go together. From the time the vines begin to blossom until the frost kills them, the bees work on them and we have more melons, citrons, cucumbers, etc., than we ever had before we started to keep bees. Last year our vines were all loaded; in fact, some of them had almost too much fruit, and I am sure it is on account of the bees pollinating the blossoms. The bees seem to work on every thing in the garden. Even potatoes, when they are in blossom, are visited.

I have heard complaints from some that bees will "eat" fruit; but they do not bother us in this way. We can not find that bees are troublesome in any way, in fact. Our garden is close to the main road where teams are passing only a few yards from the bees, but I have never heard of any one getting stung. I have found that bees are generally harmless if left alone.

In my work around the hives I have never used a smoker. When I want to do very much work, such as extracting, etc., I select a time when the weather is warm and the bees good-natured. I use gloves and an Alexander veil, however. This veil, by the way, I regard very highly. It is nice and cool, is good protection, and yet one can see easily to do any kind of work.



Apiary and orchard of C. Koppenhafer, in the village of Brownhelm Center, Ohio.

I think that white clothing annoys the bees less than darker-colored fabrics. I have made observations for a long time to determine this point, and I find that the bees do not get stirred up as easily when I have on a white coat. One day last summer Mr. J. Boyd, who has his bees also in this garden, was with me; and while I received no stings, the bees kept stinging his black felt hat.

Gladstone, Manitoba, Canada.

[We are sure you would find it easier to work with your bees if you used a smoker. It is not necessary to blow smoke over the bees continually; but very often a little whiff of smoke at the right time prevents a general uprising, and enables the operator to go right on with the work without letting the bees find out they can have things all their own way.—ED.]

BEEKEEPING AND FRUITGROWING

BY C. KOPPENHAFER

I have a fruit farm of $7\frac{1}{2}$ acres in the village of Brownhelm Center, located among the trees as shown in Fig. 1. There are over forty colonies of bees which I find a great help in fertilizing the fruit-blossoms. In 1910 I secured \$200 worth of fine honey from 23 colonies, spring count.

Some of my neighbors across the street are making me a lot of trouble, and threatening to compel me to get rid of my bees. I am not able to make them believe that the bees do not spoil their fruit, nor that they are of any benefit in the spring in fertilizing the blossoms. One man in particular said it was an imposition to the neighborhood to have the bees there; and if there was any



Mr. and Mrs. C. Koppenhafer and their family of honey-eaters.

law to make me dispose of them he would take advantage of it. However, for all that we are friends so far as I know. He was exasperated only when the grapes and plums were ripe. For a few days at that time the birds were very bad; and as the bees had nothing else to do, they of course were troublesome. I have over forty plum trees myself, and also some grapes, and I know well enough that it is not the bees that do the mischief. It is also claimed that the bees damage the peaches; but I have my bees right in the peach orchard, and I find that they never work on any except the pecked or decayed ones. I picked all of my peaches without a veil, and never get stung.

The other illustration shows you my family of honey-eating boys. I think the use of honey in the home avoids many a doctor bill. My wife is also of the same opinion. She takes great interest in the bees, and often hives swarms when I am not at home. Amherst, Ohio.

BEEES AND ORANGES

BY J. SLIGER

My apiary is located on benches above the ground, because I have a weak back, and I can handle the frames more easily if the hives are up a few inches. In the spring of 1910 I began to build up the apiary and increased from ten to thirty-eight colonies. I intended to paint the front of every other hive green; but other work crowded me so that I neglected it, and, in consequence, I lost a lot of queens which, in returning from their flight, went into the wrong hives. That fall I united until I had twenty colo-

nies, and last spring I increased these to forty-eight colonies.

I have a fruit ranch of twelve acres—ten acres of oranges and about two acres of apricots; but I intend to take these out and put in oranges. I have raised berries of different varieties, but I am taking these out to put in oranges. I have found plenty of work to keep a man of sixty-three years busy.

Redlands, Cal.

THE MISREPRESENTATIONS OF LAND SHARKS AND THEIR VICTIMS

The Truth about Wharton County, Texas

BY W. H. MOSES

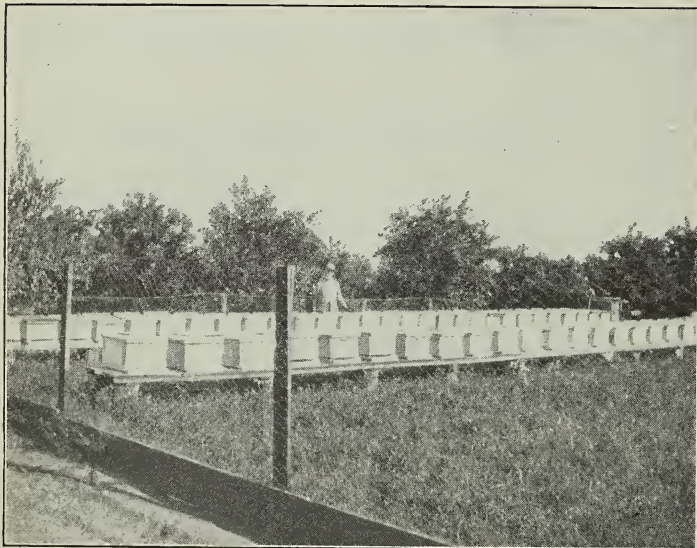
Many northern people are being persuaded to come to the coast country of Texas through the misrepresentation of land agents and others who hold out great inducements to homeseekers, offering them land at about \$45.00 per acre, one-fifth cash and one-fifth per year without interest or taxes, telling them that they can grow two or three crops a year, each worth \$150 to \$200 per acre, and that they can grow oranges, grapefruit, and other things that belong to tropical countries; and that the temperature seldom goes as low as 40.

I have lived here in Wharton County since 1887, and have never seen a winter pass without a freeze. Here is a cold-weather record I have kept: 1899, Feb. 11, began to snow at 2:30 P.M.; temperature 22 at 6 P.M.; 18 at 7 P.M.; Feb. 12, zero at 8 A.M.; Feb. 13, 4 above at 7 A.M.; ice three and one-half inches in a tub in the yard.

Nov. 3d and 4th, first frost that fall.

1905. — Feb. 2, rained. Norther came up at 2 P.M.; 3, rained; cold north wind; 4, rained. Temperature 30 at 12 P.M.; 5, rained; 32 at 7:30 P.M.; 12, rained last night; north wind this morning; temperature, 36 at 7 A.M.; 26 at 9 A.M.; 24 at 11 A.M.; 22 at 2 P.M.; 20 at 6 P.M.; 13, temperature 16 at 7 A.M.; 14, temperature 20 at 7 A.M. The lake froze over hard; will hold me up (175 lbs.). March 20 and 21, frost; temperature, 32—34.

1907.—One rain in January; one rain in February; one frost this winter — the warmest



J. Sliger's apiary, Redlands, Cal., which he runs in connection with an orange ranch.



Summer home of S. Geo. Stevens, surrounded by the birds, the flowers, and the bees.

and driest winter in 20 years. Bees gathered pollen Jan. 8. March 15, bees very strong.

1909.—Jan. 31, no rain since Dec. 20. Only one freeze and three frosts this winter.

Feb. 14, norther struck at 12 M. Temperature, 56; 32 at 7 P.M.: 15, 20 at 7 A.M.; 20, bees suffered a great loss in young brood.

1911.—Jan. 1, bees gathering pollen today. Temperature 65 at 10 A.M.; 2, cloudy north wind; 30 at 10 A.M.; temperature 24 at 4 P.M.; 3, 12 at 7 A.M.; June 13, temperature 110 at 2 P.M. on my porch.

1912.—Jan. 11, temperature 60; bees flying nicely; 12, north wind blew last night, about 8 P.M.; temperature, 18 at 11 A.M.; 13, temperature 10 at 8 A.M. Ice one and one-half inches thick on canal at Lane City.

The boys are having a fine time on the ice. Two boys from Ohio think it is fine, but both broke the ice and went into water about two feet deep.

Lane City, Tex., Jan. 14.

LIVING CLOSE TO NATURE

BY S. GEO. STEVENS

Our first swarm of bees came to us in July, 1910; and, not knowing much of bees, I divided them and made two colonies. In the fall I took 50 lbs. of surplus comb honey from them, and wintered them in good shape on their summer stands.

This summer we made ten colonies of them with some little help from other bees I bought in August, and this fall I got about 100 lbs. of honey, and all the hives were in good shape for winter—no feeding. With what I bought we have 32 colonies in all, and will winter them on summer stands.

We have about our cottage a sort of combination of insect and bird life, in both of which we are very much interested. We feel that our first colony of bees was largely the cause of our interest in the birds.

Duluth, Minn.

[Our correspondent is a great friend of the birds, and he has tamed them until many of them will fly from the trees to eat from his hand. He has done a vast amount of good in writing articles for the press, condemning in no uncertain terms the boys and men from the cities who take a fiendish delight in killing "these creatures who come to live with us, and who make life just that much more worth living."—ED.]

THE RIPENING OF NECTAR

Does the Body of the Honey Vary According to the Humidity of the Season?

BY T. P. ROBINSON

Arthur C. Miller, page 23, Jan. 1, tells how bees ripen nectar. I am not particularly familiar with the bee's way of depositing her load in the cell; neither do I know that bees ever take up this nectar again except to deposit it in a more convenient place. But I doubt very much whether they make a practice of taking it up for the special purpose of curing it; and my doubts are based on the fact that the body of my honey varies just as does the humidity of the season. This variation in body is further due to the strength of the colony.

I have known many times when the evaporating or drying out of the water was almost entirely omitted, and the honey soured in the



The three best industries of Pecos Valley, New Mexico, fruit, bees, and alfalfa.

combs. I have known this souring to be so bad that the combs would "burst" in the hive and the honey would run out freely. But these extreme cases have been largely confined to weak colonies. It is certain that the bees were bent on gathering all the nectar possible during the day, and were not numerous enough to fan it dry at night nor to create sufficient heat.

THE FIELDERS DEPOSIT THE HONEY IN THE CELLS.

In the editor's footnote, p. 24, Jan. 1, he says that it has been repeatedly stated that bees on returning from the field do not deposit their nectar directly in the cells, but pass it around to bees in waiting which cure it before depositing it. Allow me to give contradictory evidence.

Five years ago I had a yard of 100 stands of bees without food, and on the point of starvation. It had been raining for eight days, and all the colonies had been kept indoors. The weather had been dry for five weeks previous, and for ten days before the rains the bees had been gathering just enough honey to live on day by day. Brood-rearing had entirely ceased. I was watching, and was in readiness; but hoping that the weather would become fair I delayed feeding as long as possible.

I observed that the bees were carrying out their last cells of drone and worker brood, for they had a little; so I took 25 pounds of sugar and 3 gallons of water and made a thin syrup, placed it out for the bees, and in 30 minutes it was all in the hives. I made an examination 35 minutes after placing out the food; and what did I see? I found this fluid in varying amounts in the cells in the brood-box from the deformed cells on the top bar to the imperfect cells on the bottom bars. The sole idea of the bees seemed to be to get the stuff in the hive.

That night a great humming was heard, for it was in May. Now notice! Twenty-four hours later the queens had begun to lay, and this nectar in the meantime had been

gathered up and placed in proper rings for the brood nest just above the eggs.

The next day, 48 hours after the first feed, I gave them 1 lb. a colony instead of half a pound, as at first, and the bees made a worse scattering of it in the hive than before, but by the next day all was gathered up and placed in proper order. No, bees do not pass the stuff around, but deposit it at once and go for more.

It doesn't take much of a shake to scatter new nectar all over, then if combs are tilted too much the nectar will run out on the ground; but it tastes unlike honey, being watery and of strong flavor.

DO BEES "ROAR" WITH THEIR WINGS?

Mr. Miller doubts whether the great roaring could be caused by the wings of one colony of bees. I emphatically disagree. A good swarm of bees on the wing (and the bees do not all go with the swarm) can be heard plainly 100 yards away on a still day; but the hum of a colony at night would not seem so loud 50 ft. away.

Bartlett, Tex.

[That laden bees give their loads to *other* bees was not our statement, but an old current notion. We merely mentioned it in our footnote as an illustration of how old theories have to give way to later and more careful observation. Your statement on the point supports that made by A. C. Miller, which is doubtless right.—ED.]

A 200-COLONY APIARY IN A NEW MEXICO ORCHARD

BY J. S. HIGHSMITH

The illustration shown herewith is a picture of my apiary of 200 colonies of fine Italian bees. In 1910, by the 1st of September we had over 8000 pounds of surplus comb honey from alfalfa, which was very fine, being clear and white. I began with only a few colonies in the spring of 1908.

The picture represents three of the best products of Pecos Valley—honey, fruit, and alfalfa. The apiary is in a small four-year-old apple orchard and is surrounded by fields of alfalfa.

Artesia, New Mexico.

THE HONEYBEE AS A FERTILIZING AGENT

BY DR. E. F. PHILLIPS

The honeybee is known widely as the producer of honey, and it is recognized that this makes it one of the minor agricultural animals. The total value of the crop produced is not fully realized, and it is often a surprise, even to well-informed beekeepers, to learn that the average annual honey crop of the United States is worth about \$20,000,000. The American farmer produces crops of such gigantic proportions that a branch which can not be discussed in the millions is scarcely worthy of consideration. Even in this galaxy of wealth the honey-producer has no reason to be ashamed of his specialty, and he may be further congratulated on the fact that his field is just beginning to be occupied. We can not yet foresee an overstocking of the country, and an overproduction of honey will not take place until we are producing at least ten times what we do now.

The subject which is here announced at this time does not, however, deal with the direct benefits which accrue to American agriculture through the offices of the honeybee, but to what may be styled the indirect benefits. These are recognized by specialists, but are passed over unnoticed by the average farmer or citizen, and it is to recount the indirect benefits that this subject is assigned.

POLLINATION OF FLOWERS

As is well known, blossoms, before they set, must be pollinated. That means that pollen from the anthers, or male portion of the flower, must reach the stigma, or female portion. Different plants exhibit wide variation in the arrangement of these parts, and it may be well to recount some of these different plans. In some cases the male and female organs are in separate flowers, as in the case of corn, the male flowers being the tassel and the female flowers resulting in the ear. In other cases the types of flowers are borne on separate plants, as in the case of the mulberry.

In the majority of plants, both anthers and pistils are found in the same flower; but even here an extremely wide variation is found. In some cases the anthers ripen earlier than the pistil, so that the pollen produced is ineffectual in producing fertilization of that particular flower. This is shown in the fireweed, or willowherb, which is an important honey plant, especially in Northern Michigan. The reverse condition in which the stigma matures is first observed in the common figwort *Scrophularia*

nodosa, and to some extent in horse chestnuts.

In other cases, the anthers and pistil mature at the same time; but because of their relative position, self-fertilization of the blossom does not occur. Other arrangements of this kind might be mentioned; but enough has been said to indicate that flowers are often so arranged that self-fertilization is impossible. In some cases of pears and plums it has been shown that the pollen is ineffectual in fertilizing the flower, even if placed on the stigma. These arrangements all confirm the popular belief in the dangers of close inbreeding, and point to the desirability and often the necessity of cross-fertilization.

Fertilization of plants occurs in two general ways. Plants like willows, pines, oaks, and birches, and, in general, plants whose flowers are inconspicuous and often not even recognized by the layman as flowers, are so constructed that pollen is carried by the air currents from the anthers to the pistil. The pollen of such plants is light and dry. Most flowers, however, are not of this type, but require some agent to carry the pollen, and these agents are usually insects. Without the kindly offices of insects which are despised as an order of animals by the majority of people, our fruit crops would cease to be, and the flowers which abound would no longer bloom.

RELATION BETWEEN PLANTS AND INSECTS

It may also be said that plants have a greater appreciation of insects than we have, for we see the most wonderful arrangements for attracting insects to the flowers so that their visits will result in cross-fertilization. The pollen is not intentionally carried and put in the right place, but is transported on the hairs or otherwise as the insect goes from one flower to another. Insects go to flowers to gather pollen or nectar to be used as food at once, or to be removed and stored, as in the case of the honeybee. Pollen is produced in such abundance as to act as an attraction to pollen-feeding insects, and still leave a sufficient quantity to insure proper fertilization. Nectar acts also as an attraction, and probably serves no other purpose to the flower.

The question of what insects are most important in carrying pollen has not been sufficiently investigated. In the comprehensive investigations of Müller, he found that in low Germany 2750 out of 6231 visits of insects to flowers observed were made by *Hymenoptera*, and of this number 2191 were by *Apidae*, the family to which the honeybee belongs. He frequently refers to the fact that on some plants the honeybees and bumblebees play "by far the most important part in fertilizing our (German) indigenous flowers." Waite, in his bulletin on "The Pollination of Pear Flowers" (Bul. 5, Div. of Veg. Pathology, U. S. Dept. Agr.), mentions a large number of species of insects which visit pear blossoms, but says: "The common honeybee is the most regular and important abundant visitor, and

probably does more good than any other species."

In an article read before the Ontario Beekeepers' Association in December, 1900, by the late Dr. James Fletcher, he said: "It can be shown that, owing to its size, weight, and habits, no insect is so well calculated to ensure the fertilization of fruit-blossoms as the honeybee, which flies rapidly from plant to plant, and, by running over the flowers in search of pollen or nectar, brushes off the pollen and carries this vitalizing element on the hairs of its body to the next flower visited. The habit of the bees, which has frequently been noticed, of confining the visits, when collecting largely to the same kind of plant, is taken advantage of by the beekeeper to store up at certain seasons particular kinds of honey, such as apple, raspberry, basswood, clover, and buckwheat honeys. This habit is also manifestly advantageous to the plants on account of the pollen which is carried by the bee being of the kind necessary for the fertilization of its flowers, which could not be affected if the pollen were that of some other kind of plant."

In some work done at the Michigan Agricultural College it was shown that, of all the insects collected on apple trees in bloom, none were so abundant as the honeybee. On the other hand, similar collections made at the Connecticut Experiment Station at New Haven showed very few honeybees. The latter results may be explained by the fact that, in the preceding winter, over seventy-five per cent of the colonies of honeybees in that section of the country died, and by the fact that bee diseases had probably further reduced the number of bees in that section, as they are abundant in that State. Moreover, we should not expect to find many bees in a city on the seashore. The growing of cucumbers under glass is an important industry in Eastern Massachusetts and in other parts of the United States. The Massachusetts cucumber-growers annually use about 1000 colonies of bees in their greenhouses to pollinate their blossoms, in place of the former method of pollinating by means of a camel's-hair brush.

While the honeybee is, perhaps, no better equipped than other insects, especially other bees, for carrying pollen, there is one respect in which it outranks all others as a valuable asset to the fruitgrower. We are not able to propagate other insects in quantity, and introduce them to orchards at the proper time; but it is a very simple matter to carry in colonies of bees to insure a crop, if the weather is fit for bees to fly. Many orchardists realize this, and keep bees solely for the benefits derived from cross-fertilization of the fruit-blossoms.

COMMON INTERESTS OF THE BEEKEEPER AND FRUITGROWER.

The interests of the beekeeper and of the fruitgrower are identical. In the past there has arisen from time to time bad feeling between these two classes of farmers. The fruitgrower claims that the bees destroy his ripe fruit; but this has been entirely dis-

proven. Bees never suck ripe fruit unless it is previously punctured by birds or insects, such as wasps, or unless it is decayed. On the other hand, the beekeeper claims that the fruitgrower sprays his trees while they are in bloom, thus killing the bees. This procedure is not recommended by any entomologist, and is not practiced by well-informed orchardists. It is prohibited by law in New York and in some other States. Cases of this antagonism are still to be found, but they are becoming more and more rare. Let us hope that the time will soon come when the beekeepers and fruit-growers will meet in common conventions to discuss their problems in common.

The production of the millions of dollars' worth of fruit in the United States depends largely on insect pollination; and no insect is so important in this work as the honeybee. It is a most conservative estimate to claim that the honeybee does more good to American agriculture in its office as a cross pollinator than it does as a honey gatherer.

Washington, D. C.

HOW POLLEN IS COLLECTED

The Part Played in the Process by the Auricle

BY F. W. L. SLADEN, F. E. S.

The pollen dust gathers on the body hairs of the bees as the result of the visits paid to the flowers. These hairs, as seen under the microscope, are branched, and therefore are admirably adapted to hold the pollen.

In the bumblebee (and probably also the honeybee) the pollen dust in the hairs on the thorax is collected on brushes on the inner sides of the metatarsi, or basal joint of the foot, of the *middle* pair of legs, which are moistened with honey from the tongue to make the dust cohere. The pollen dust in the hairs on the abdomen is collected on brushes on the inner sides of the metatarsi of the *hind* legs, and this is probably moistened by rubbing the hind legs together.

After this the pollen is transferred to the corbicula (or pollen-basket) on the tibiae of the hind legs, where, as every one knows, it accumulates into a great lump as the result of repeated contributions from the metatarsi. But how does it get there? It is evident, as Cheshire observed, that the pollen on the right metatarsus is transferred to the left corbicula, and the pollen on the left metatarsus is transferred to the right corbicula. Cheshire supposed ("Bees and Beekeeping," 1886) that the metatarsus discharges its pollen on the corbicula by scraping its brush on the upper side of the tibia; but I find that this is not the case. The pollen is scraped off the metatarsal brush by a comb (*c*) situated at the end of the tibia on the inside, and it passes into a small concave receiver (*d*) that joins the comb; then, when the leg is straightened, a projection on the metatarsus called the auricle (*e*) closes upon the receiver, compresses the pollen,

and at the same time forces it out to the lower end of the corbicula, which is here slightly depressed and almost devoid of hairs. The compression of the pollen in the receiver is an essential part of the process; for loose pollen grains such as occur on the metatarsal brushes would not hold together in the corbicula. In the bumblebee the angle between the surface of the receiver and that of the corbicula is obtuse, and the compressed pollen easily passes from the one to the other; but in the honeybee there is a sharp angle at the corner, and the auricle bears a fringe of hairs (*f*) to guide the stream of pollen to the corbicula; also the honeybee's auricle is evidently pressed back by the pollen, for it has no other means of escape.

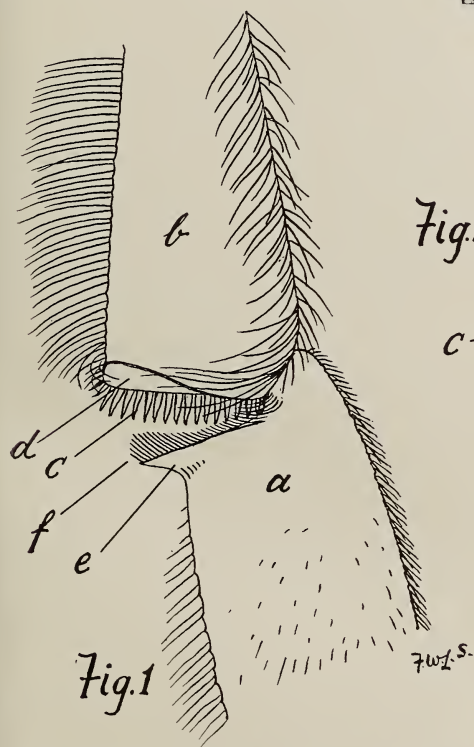


Fig. 1.—Juncture of tibia and metatarsus in hind leg of worker honeybee, outer side.

Fig. 2.—Diagrammatic section of the same, showing mode of conveying pollen.

a, metatarsus; *b*, tibia; *c*, comb; *d*, receiver for pollen; *e*, auricle; *f*, fringe of hair on auricle.

I forced a queen bumblebee to relax, and, after placing some pollen obtained from a comb taken out of one of my hives in the receiver, I straightened the leg. The pollen was immediately delivered to the corbicula. I was struck with the freedom of action of the joint, and noticed that the auricle could be placed in the receiver in various positions, so that it can not only compress pollen there, but it can scrape out the receiver, and, on the other hand, can deliver the pol-

len high up on the corbicula. In the honeybee the joint works still more freely. The fact that, in the bumblebee, the pollen always begins to collect at the apical end of the corbicula, is now clear, and we see why the corbicula is so smooth and bare, for the pollen actually slides up it.

It is a significant fact that, although the corbicula is surrounded with a fringe of stiff hairs which act, as Cheshire observes, like the stakes that the farmer places round the sides of his wagon when he desires to carry hay, this fringe is interrupted at the spot where the receiver discharges its pollen on the corbicula. In the bumblebee the entrance here to the corbicula carries only about three stiff hairs. These hairs are short

and upright, and widely separated from one another, and are some little way inside the entrance. It is evident that their function is to provide a means of attachment for the pollen until the lump has grown large enough to be enclosed between the hairs at the sides of the corbicula. The entrance to the corbicula is, in the bumblebee, densely dotted with fluff (under the microscope mossy hairs) which also probably help to hold the pollen. In the honeybee there are no stiff hairs, and very little fluff in the entrance to the corbicula.

In the bumblebee the long hairs on either side of the entrance to the corbicula form a wide and shallow arch over it. The object of this arch is, no doubt, to help to support the lump of pollen on the corbicula without interfering with the passage of fresh pollen to the corbicula. The arch also helps to guide the pollen to the corbicula. In the honeybee the arch is less pronounced, and consists chiefly of hairs from the lower side, and these are so long as to

stretch almost across the tibia.

These facts add an interesting page to the wonderful story of the bee that is not given in our text books. How often have we seen the bees humming around the flowers, busily scraping their dangling legs together, and every now and then giving them a little jerk! At each jerk a minute quantity of pollen is tucked up on the corbicula.

On examining the workers of several spe-

cies of *Melipona* from South America in my collection, I notice that, although they possess a very wide corbicula and a comb, the auricle is absent, and the metatarsi are extremely narrow at the base. Apparently, therefore, in these bees, the pollen is not compacted, but is scraped on the corbicula by the comb in a loose state, and the corbicula bears a beautiful rack, like a long-toothed comb, to retain it. The shape of the metatarsus in some species, however, suggests that it may be bent up so that its upper edge presses against the end of the tibia to form a pollen-press.

In the solitary bees there is no corbicula, the pollen being conveyed on brushes situated either on the hind legs or on the under side of the abdomen.

SOME SPECIFIC OBSERVATIONS; HOW HONEY IS MADE USE OF.

On Feb. 11, a mild and sunny day, my bees were working busily on the winter aconite, *Eranthis hiemalis*; and by watching them I was able to verify my opinion as to how the pollen is gathered as mentioned above. I watched one bee for over five minutes, rifling flower after flower. During this time its loads of pollen increased in size considerably; but it did not once cross its hind legs, rubbing the metatarsal brushes on the edges of the opposite tibiae, as Cheshire supposed, although it frequently rubbed or scraped the inner sides of the metatarsi against one another, the motion being always longitudinal.

I noticed that the pollen dust was gathered direct from the anthers on the metatarsal brushes by the bee crawling about among the stamens and digging its legs in among them. In large open flowers, such as the winter aconite and the blossom of the apple, cherry, and plum, the anthers of which are accessible to the hind legs, the pollen dust is probably always gathered in this way, namely, direct upon the metatarsi.

But what makes the pollen dust cling to the metatarsal brushes? If a lump of pollen from the corbicula of a bee be examined, it will be seen that it consists of pollen grains made into a paste with some liquid; and if the lump be tasted it will be discovered that this liquid is honey. Obviously, the metatarsal brushes are moistened with honey, and so the pollen dust adheres to them. It seems plain, too, that the honey comes from the tongue. But though I watched my bees carefully I never saw them lick their hind metatarsi, and I do not think that the tongue could reach the hind metatarsi. Indeed, the only way the bee could convey honey from its tongue to its hind legs would be through the agency of the fore and middle pairs of legs. The tarsi and metatarsi of the fore legs are covered with stiff bristles, which are adapted to receive the honey, and the metatarsi on the middle legs are provided with brushes of stiff bristles which are similar. In watching the bees working on the winter aconite I saw their middle and hind metatarsi rubbed together on several occasions, and,

in several bees I killed, the brushes on the fore metatarsi were saturated with honey. But this rubbing of the middle and hind legs together was seen to take place far too seldom (namely only three times during the whole of my observations, which lasted, I should think, nearly half an hour) to moisten effectively the pollen grains, and thus I am led to conclude that the moistening of the hind metatarsi is generally carried out during the flight from flower to flower. Indeed, if one thinks of it this flight provides a most suitable interval in the work of the proverbially busy bee in which to discharge this apparently most necessary duty; and the bee, by acquiring the instinct to moisten its metatarsi, then would be able to do it mechanically, just as often as it is necessary. One must remember, too, that, during flight, the legs are free.

I must ask for the indulgence of the reader in dwelling so much on what I imagine, and so little on what I have actually seen; but this is a case in which the movements made by the bee are too quick to be followed by the eye, and I think that an examination of the pollen-collecting organs, a study of the bees in the flowers, and the following of my argument, will bring conviction that the process of pollen-collecting is very much as I have described it.

Ripple Court Apiary, England.

NEW LAW ON SPRAYING IN OHIO

What to Do if an Orchard is Too Large to Spray all the Trees when they are Not in Bloom

BY N. E. SHAW

Chief Inspector Division of Nursery and Orchard

[We wrote Prof. Shaw regarding the new spraying law in Ohio, and his reply follows.—ED.]

The new law does not become effective until May 31 of the present year. Spraying is required between the 1st of November and the 30th of April. This is for the destruction of scale insects; and any solution which is used for this purpose can not be applied after foliage has appeared or buds have opened, because of the injury that would result. The material used for these applications would of necessity have to be the lime-sulphur wash, miscible oil, or some similar solution, and not an arsenical poison.

I have received many inquiries from bee-men concerning the spraying of fruit trees while in bloom. Most of them are under the impression that there is a law in this State against spraying at this time; but, of course, such is not the case. Neither the Experiment Station at Wooster, the College of Agriculture, nor this department, all of which send out a spray calendar, advocate spraying when trees are in bloom. In fact, we lay stress upon the fact that no application should be made at this time, but after the blossoms have fallen, or at least most of them. Recently one of our large commercial orchardists, whose acreage is too

large for his spraying equipment, made the statement that he intends to begin spraying for codling worm before the blossoms have begun to fall, in order to cover his entire orchard in proper time.

I called his attention to the fact that he would, no doubt, receive considerable injury from such an application, to which he replied that it was about six of one and half a dozen of the other; because if he did not get over his entire orchard the unsprayed part would be of no use to him.

I told him that, if his plan were very generally adopted, it would probably lead to the passage of a law prohibiting spraying at blooming time. I do not think that, should he undertake to do this, he will be very generally followed by others, because most of them have suitable spraying equipment for their needs; and while this man has been looked up to considerably in the past, and has had his methods copied by others, he does not hold the same place as an orchardist in the estimation of others at the present time.

I assure you I shall be glad to do whatever I can to enlighten our fruitgrowers on this matter, and hope that we shall never need a law to prevent spraying while trees are in full bloom.

In regard to this compulsory-spraying law I will say that the same is not under the control of this Division, and we are in no wise responsible for its passage.

Columbus, O., March 1.

ARE HONEYBEES OF ANY VALUE TO THE ORCHARDIST?

How Many Colonies are Needed per Acre of Fruit?

BY BENJAMIN W. DOUGLASS

The Greenhorn had just purchased a small orchard and had started out as a full-fledged convert to the "back-to-the-soil movement." Unlike many such greenhorns, he did not consider that he knew all there was to be known about farm and orchard work. He knew enough to know that you can not learn horticulture simply by reading books in the back parlor, and that fruitgrowing requires more than a theoretical knowledge in order to make it a success.

Since I had known the Greenhorn for many years it was but natural that I should be asked to contribute my share of information toward making the new orchard a success, and I accordingly made a careful inspection of his place soon after it was bought. This was in the spring of the year, shortly after the apple trees had blossomed—and they had blossomed lavishly. To the owner's surprise, however, the stand of fruit was exceedingly poor, although there had been no frost to injure the flowers.

"It seems to me," said I, "that your only trouble here is a lack of pollination due to the absence of bees."

"But," he replied, "I have a colony of

bees up under the grape-arbor at the house, so that surely can't be the reason for the trouble."

So I had to analyze the situation for him; and, briefly, this is what I said:

"Your house and the single stand of bees are nearly a quarter of a mile from the main part of this orchard. The past weeks have been very wet and cold, although not cold enough for frost. The hours of sunshine have been very brief; and during the period when the trees were in bloom the sun shone for only a few minutes at a time. Bees will not fly in such weather, or at best they fly but a short distance from their hives. Consequently your crop has failed because you did not have numerous colonies of bees scattered through your orchard. If you had done so the bees would have taken advantage of every minute of sunshine and given you a full crop where you now have a failure. If my theory in this is correct we should find that your trees near the house, in the 'family orchard,' have more fruit than these in the main orchard."

We at once investigated, and found that the trees near the house had set a very fair crop of apples. In the main orchard there were more apples near the house than there were on the further side of the orchard; for, as I have said, in that part the crop was a failure.

"Well," said the Greenhorn, "how many colonies of bees should I have on my twenty acres of orchard? and how close together should they be placed? or should they all be placed in one spot, such as the center of the tract?"

Here was a question that I could not answer with any degree of finality. It is impossible to draw a definite conclusion regarding the exact number of bees that should be kept in order to assure good pollination. Some seasons very few bees will suffice, while it is possible to imagine a blossoming season when *any* quantity of bees would fail to provide pollination. After a long series of observations on this subject I admit that I am still, almost as far from a definite conclusion as I was at the start.

In the spring of 1911 I assigned one of my assistants to a study of the insects concerned in the pollination of the apple, pear, and cherry. Without going into his results in detail I will quote from field notes made at different times during the season:

April 20.—Warm and clear. An abundance of wild bees, and flies of various species. Honeybees present in large numbers.

April 22.—Partly cloudy; cold and windy following a rain; native species of bees and flies very scarce; honeybees fairly common.

May 9.—Warm and clear. Many small native bees on cherry; in numbers they exceeded the honeybees. On the apple the honeybees were the most numerous, exceeding all other species. Syrphid flies were quite common throughout the orchard.

These notes and studies were made in an orchard where there were about seventy col-

onies of bees. Comparative notes made on other orchards in the vicinity on April 22 showed that very few honeybees were to be found. This proved conclusively that the presence of the apiary in the orchard was of material value in securing pollination.

There can be no rule as to the definite number of colonies that should be kept for each acre, because of several variable factors which enter into the problem. In the first place, individual colonies of bees will vary, not only in strength, but in the aggressiveness of the members of the hive. Some colonies will range better and cover more ground in unfavorable weather than other colonies. The main difficulty, of course, is due to the fact that no two seasons are exactly alike, and the number of colonies that would be satisfactory one year might be totally inadequate the next season.

During an unfavorable season a large number of colonies close to the trees may insure a full crop when all the other trees in the neighborhood fail. This was repeatedly shown in the orchard of Mr. George S. Demuth, at Peru, Indiana. Mr. Demuth was primarily a beekeeper, and his apiary was located in a small orchard. Year after year this orchard set a full crop of fruit, even in cold rainy seasons when the neighbors all thought that the fruit was killed by frost. It is quite probable that no small part of the frost-killed fruit is simply injured by a lack of pollination. It is certainly true that fruit that is well pollinated is more vigorous, and consequently more resistant to insect and fungous injury, later in the season.

To return to the Greenhorn. With a persistence that was most aggravating, he insisted that I had avoided his direct question as to the number of colonies that he should keep per acre, and how they should be spaced. In answering this direct question I will simply say that, for my own use, I am intending to keep bees in the orchard at the rate of one colony for each two acres of orchard. For 140 acres of orchard I plan to have 70 colonies. These will not all be kept in one place, but will be divided up into groups of ten or fifteen each, and will be placed at advantageous points about the orchard. I would avoid stringing the hives over a great space in the orchard, as there are some men who are afraid of bees, and there may be such a man in one of your gangs at spraying time. If the bees are bunched in one small locality the trees around them can be left unsprayed until late in the evening, and the work can be done after the bees are through flying. Under no circumstances should the trees right around the apiary be neglected because of the bees. In fact, they soon become accustomed to having people around them, and it is seldom that they cause any trouble.

SOME MISCONCEPTIONS ABOUT SPRAYING

Every season we have any number of accounts of how some farmer has killed all the bees in his neighborhood by spraying his fruit. Sometimes such a report is true. In the great majority of cases, however, it

is not. When the practice of spraying first came into use a number of years ago, some manufacturers of spray-pumps published the directions for spraying in such a way that many farmers were led to an incorrect notion of the process. From this first misinformation has come much trouble, and many explanations have been needed to clear matters up between the fruitgrowers and the beekeepers.

As a matter of fact, the interests of the fruitgrower and the beekeeper are identical in many respects, and there is no cause for any misunderstanding between the two industries. Many fruitgrowers are seeing the value of bees in the orchard, and many beekeepers are beginning to realize the value of the honey harvest from the fruit bloom. No fruitgrower who pretends to know the first thing about spraying will attempt to spray his trees while they are in bloom. To do so would not only injure his friends the bees, but would also result in some actual damage to the blossoms.

WHEN TO SPRAY

The first spraying should be applied before the buds open, at a time when the bees are not interested in the trees in any way. The second spraying comes *after* the petals have fallen; also a time when the bees are no longer interested in the orchard. Bees attend very strictly to their own business; and after the nectar has dried up in the flowers they are a dead issue so far as the honey-gatherers are concerned. It is the second spraying that usually causes the fight between the orchardist and his bee-keeping neighbor. Very often the neighbor will become alarmed as soon as he sees the spray-machine at work, and in some cases he will claim that every dead bee that he finds for weeks to come was killed by the arsenic spray.

A NEW SPRAYING SOLUTION THAT IS REPELLENT TO INSECTS

During the last two seasons a new spray material has come into very general use over the country. This is the dilute lime and sulphur solution as a substitute for the old Bordeaux mixture. The Bordeaux was simply a mixture of copper sulphate and lime, and it was used in connection with the arsenate of lead or with Paris green. The new sulphur spray requires the addition of the arsenic, just as the Bordeaux did; but it possesses the added advantage to the beekeeper that it is repellent to all insects. The smell of the sulphur is so strong that trees sprayed with it are notably free from insects of all sorts during the period through which the smell lasts. In this way the bees are repelled along with certain injurious insects (notably the plum curculio). This repellent action of the lime and sulphur will no doubt go a long way toward easing the fear of the beekeeper. For my own part I feel so sure of the repellent value of the sulphur that I will venture the assertion that no harm would result to the bees, even if the orchard should be sprayed while in full

bloom. Of course it would be highly undesirable to spray the trees when they are in full bloom; but I simply make the statement to show my confidence in the repellent value of the solution.

I should be very glad to hear the last of the controversy concerning the killing of bees by spraying; but I know that there will always be beekeepers who will not read, and fruitgrowers of the same class; and, further, that there will always be the individual who is ready to pick a fight with his neighbor. I have no doubt that the spray-machine will continue to be a sore point with beekeepers for many years, just as the stinging, stealing, and "eating" of fruit by his neighbor's bees will continue to be a thorn in the side of the unreading orchardist.

In conclusion I will say that the Greenhorn bought some bees, thereby improving his chances of success, and, incidentally, opening the way to much ultimate pleasure, although we will admit that beekeeping for the beginner is not an unmixed joy.

Indianapolis, Ind.

THE RECENT NEW YORK STATE CONVENTION

Raising Cells without Queen Cups or Grafting; a Simple and Practical Plan for a Honey Producer

BY R. F. HOLTERMANN

Many years have passed since I attended my first convention of beekeepers in New York. I am told it was thirty years ago at Rochester. Many beekeepers I have known have since then fallen by the way to remind us, too, of eternity.

The convention which has just closed at Syracuse, and at which the writer was present (for the New York State Department of Agriculture was largely attended), there appeared to be dozens of men who were operating from 400 to (if I am not mistaken) over a thousand colonies of bees, and I heard of more like them in the State. These beekeepers impress one; they know their business; they are not content with going in well-known and beaten paths, but they are on the outlook for improved methods, be they original with themselves or not. They have an understanding that, to combat ideas, is not to be antagonistic to individuals. The fire may fly in mental combat, but no friendships are disturbed by such conflict. Notably among that class is W. F. Marks and Geo. B. Howe, the latter one of the State inspectors.

Of the many good things brought out at the convention, that which impressed me most was the production of queen cells by a method which does away with the necessity of larvæ transfer or the making of queen-cell cups. In a private conversation the writer had been informed of this process by D. R. Hardy, Burrs Mills, N. Y. It appears that no one present claimed to be the originators of this method; but the New York beekeepers appear among themselves to

have given out the idea on the quiet, and Mr. Hardy, in the kindness of his heart, and out of pity for the uninitiated, had given me the wink.

The plan was made public when Mr. Oscar Dines, of Syracuse, took the floor on the morning of Feb. 1, following Mr. West on the subject, "Some Things I Have Seen," and he made us sit up and listen when this method of queen-cell production was described. Mr. Dines stated that he took a suitable comb (or two combs) and inserted it in the center of the brood chamber of the stock containing the queen from which he desired to breed. After the queen had laid in this comb, and the larvæ were ready, the comb was cut to the midrib along the topbar. Then a similar cut was made between the second and third row of cells from the topbar; another cutting between the third and fourth row; another between the sixth and seventh; another between the seventh and eighth row, and so on. The two rows of cells are destroyed to the septum, leaving rows one cell wide with a two-cell-wide space between, over the entire one side of the comb. A phosphorus match is now taken, and in the remaining rows one cell is left intact, and the larvæ in the next two destroyed, and so on throughout the comb. This prevents the joining of queen cells by the bees.

I should have mentioned that, before the comb is cut to the septum, it should be shaved down so as to leave only a shallow cell as in the Alley system.

The comb is now mounted in a rim $2\frac{1}{2}$ inches deep, and as wide and long as the hive. This rim is then placed upon a hive with the comb lying horizontally over the brood nest. The comb is so suspended that the upper side of it is level with the top of the rim, leaving ample room underneath the cut-down comb wall and the topbars of the brood frames for the development of queen cells.

Mr. Dines stated that he had secured 65 fine queen cells by this method at one time by placing the prepared combs and rim on a queenless colony. Mr. Case, of New York (I regret I did not get his initials), stated that, by taking such a comb and giving it to a strong queenless colony three days after taking away all its brood, so that the colony had no other brood or larvæ to care for, he had secured 105 fine cells. The septum of the comb became the foundation for the queen cell. It was thus readily handled. The upper side of the comb should be covered over by pasteboard to prevent the bees from paying attention to the larvæ in the cells. When the cells started are ready, a beekeeper who wants to requeen need only go to the colonies he desires to requeen, remove the old queen, and insert between the frames one of the queen cells inserted in a West cell-protector, and the colony will secure a virgin queen when hatched.

LARGE BROOD CHAMBERS.

Many New York beekeepers are in favor of ample brood-chamber capacity. One of

them, I do not remember who, stated that Mr. McIntyre, the well-known Californian beekeeper, made it a point to buy queens from queen-breeders who use large hives, as he held that queens in such hives are likely to be more prolific, and are likely to throw progeny with better laying powers.

Brantford, Ont.

[The plan here described is similar to the Alley method that was given some 25 or 30 years ago. The principal difference is in the manner of giving the prepared comb to the bees. Alley hung the comb in the regular way in the hive; but in the plan here described, it is suspended *horizontally* above the brood nest.

If we are correct, Dr. E. F. Phillips, of the Bureau of Entomology, gave this plan to the York State beekeepers some two or three years ago. Whether he or they originated the idea of placing the comb horizontally above the bees, we can not say. In any event, the plan has the merit of avoiding the use of queen cups and of grafting; and in the hands of the average beekeeper it would probably give better results than the grafting plan with queen cups.

A caution should be entered against trying to get too many cells at one time from a colony. We have raised a good many thousands of queens; but our experience teaches us that the average colony will not take care of and feed *well* more than two dozen cells. They will build as many as a hundred; but queens from such cells are apt to be short-lived or poor layers.

This method was described by Mr. Friedman Greiner on page 170, 1911; but the very fact that it is giving such general satisfaction to our friends in New York would indicate that another description, as given above, will not come amiss.—[Ed.]

HONEY-CROP REPORTS

BY WESLEY FOSTER

While attending the National Board meeting, some one (I think it was Mr. Pettit) asked me why Western beekeepers held back their report on crop conditions. I answered in an offhand way that it was, no doubt, because they hoped to get a better price by so doing. I have been looking over the honey reports that were sent in, and I do not find many that are very misleading. I am surprised that my report in the September 1st GLEANINGS, 1911, came as near being right as it did, for it was sent in before August 15. It is not possible to tell accurately about the alfalfa crop in this latitude until after August 1. Often the bees will do nothing, scarcely filling their hives and doing no swarming; then the second growth of alfalfa comes in bloom about August 1, or perhaps a little earlier, and a fair surplus is made in August and September. I should not want to give a report on the honey crop until the middle of August; and then if the weather remains hot, and the alfalfa is yielding well, the crop may be doubled in the last ten days of August.

In GLEANINGS for September 1 a good report was given of the California crop, although the crop was not as good as was expected. Was the trouble that the beekeepers did not offer their crop for sale? I reported that the Colorado crop was larger than for some years, and I now think that was a little strong, although we still have a good deal of alfalfa honey (extracted) to dispose of. Without doubt more extracted honey was produced than the market could handle, and altogether too little comb honey for the demand. Again, in GLEANINGS for October 15 a bountiful crop is reported from California. Was not part of the trouble because the producers did not offer their honey for sale soon enough? Idaho had a light crop in the west-central part, while in the Twin Falls and Idaho Falls districts it was good. The crop seems to have been good in Utah and Wyoming.

The production of honey is increasing rapidly in the West, and new districts become of shipping importance almost every year. Many of these beemen are new, and do not look for a market until the honey is all harvested. A study of conditions in marketing should be made before rushing extensively into beekeeping. There are, undoubtedly, many inter-mountain regions which would produce a fine white article of comb honey, and there would be more money in comb honey than in extracted with market conditions as they are at present.

I think that Easterners are, perhaps, as much to blame for market conditions right now as are the Western producers. In the East, on account of the poor crop they put the price up; and just as they got things started at high prices then Western honey began to come east and knocked the bottom out of the market.

In regard to Western market reports as a whole, nothing definite can be given before September or October. Many of the producers do not finish extracting until November, and it is hard to judge of the amount the supers will yield. Then we never think of offering much of our honey, especially the extracted, before the harvesting is pretty well out of the way. In case of comb honey some of us have learned to get it off as soon as possible, and often that is not early enough for the best price.

As an example I figured that one apiary would run close to 100 pounds of extracted honey, per colony, spring count. I estimated so much for each super on the hives. We did not finish extracting until November, and found it was only about a 70-lb. crop. We shall have to figure on our crop reports not being in until later, if we want to know the conditions more definitely.

There is nothing more necessary for the stability of the honey market than accurate reports, and a central head to direct the distribution of the carload shipments of honey. The West is big, and its product so large that something will have to be done to hold things steady. This is a need that the new National Association can supply.

Boulder, Col.

IS THE LANGSTROTH FRAME TOO SMALL?

The Size or Shape of Frames Not a Factor in Wintering

BY F. P. CLARE.

As Mr. Simmins' article in the January issue of the *Canadian Bee Journal* may be confusing to beginners, and as Mr. S. invites criticism, I write to draw attention to what appears to me some of the errors in the ideas he advances. He asserts positively that the Langstroth frame is *too shallow for successful wintering, indoors or out, and too small for the honey season in any locality*, and then, in the next breath, urges beekeepers to use a frame of less than three inches greater capacity. Laughable, is it not? Is it, Mr. Editor, a matter of "location making the difference"? Scores of us have proved here in Ontario that successful wintering is secured, *every time*, by the quantity and quality of winter stores, and not by the *size or shape of the frame*.

With an experience of over 30 years, with (at one time) 260 colonies of bees in 15, 12, 10, and 8 inch depth hives, I assert positively that, with an abundance of good stores, in a proper repository, bees will winter as successfully on the Langstroth frame as upon any frame with which I am acquainted.

If I were starting in the business again I would use no other, and ten of them in a hive. The points of superiority are many. Ten-inch lumber for the construction of hives can be procured quite readily, which is not as true of a deeper hive. When it comes to securing the harvest, by tiering up as well as placing in winter quarters, where do you find its superior?

The larger the hive, the greater the quantity of bees produced, and the larger the amount of honey stored, is Mr. Simmins' reasoning. Possibly this may be true of some locations, but it certainly is not true of this part of Ontario. A queen that will keep eight Langstroth frames full of brood will have to lay over 2500 eggs daily for weeks at a time. Where can queens be found that will average better than this? Allowing two frames for honey and bee-bread, we have ten frames which experience has proved are ample for an average queen in most seasons and locations.

Now, if this capacity is doubled, what will be the result? Beebread and brood through both stories, if two stories are used and honey stored in the brood nest that should have gone into the super above the queen excluder. In addition to this, honey will be used by the bees, if not pure Italians, to raise thousands of bees that are too late in coming upon the stage of action to be of any value in securing the crop of white honey. While great numbers of bees are all-important at the right time, out of season they are a detriment.

Mr. Simmins blames the eight and ten frame Langstroth hives for the average crop reported by Mr. Root. Does not Mr. Simmins know that atmospheric conditions,

over which the beekeeper has no control, generally determine the amount of honey stored? Who has not been disappointed in returns when bees were booming at the beginning of the harvest? Is the size of hive to blame for this? Thousands of colonies of bees are still kept in box hives and "gums" in mountainous regions and through the Southern States, and all these pull down the general average; but no intelligent beekeeper considers Mr. R.'s figures as the average of his apiary.

In conclusion, Mr. S., permit me to inform you that a crop of from 200 to 400 pounds of extracted honey has actually been produced by users of the despised Langstroth frame, and by those who have kept their bees in eight and ten frame Langstroth hives.

And now, Mr. S., I want you to take your pencil and figure out the bees that would be in a hive that contains the "equivalent of two 16 x 10-inch eleven-frame chambers crammed solid with brood."

Allowing $8\frac{1}{2} \times 15\frac{1}{2}$ inches of brood comb to each frame, there are about 2882 inches of brood. Allowing 50 bees to the square inch, the result is 144,100 bees. Now allow as many more bees in the hive to care for the brood and to gather honey, and there will be 288,200 bees or about 60 lbs. of bees. Such a colony should store 600 pounds easily, and the mother of that stock—is she for sale? and what will you take for her? Kindly address at once, and mark the letter *rush*.
Toronto, Canada.

[If Mr. Simmins were more familiar with the diverse conditions in this country, with all shades of climate and temperature, he would not make the statement that a 10x16 frame would enable us to do better wintering than now or to secure more honey. The Jumbo hive, with frames slightly larger, have been sold for years; but there is comparatively little demand for them. More and more the tendency seems to be to get back to the original Langstroth frame. From 1885 to 1890 there was a rage for shallow frames. During the latter part of the '90's there seemed to be a tendency toward the Quinby or Jumbo frame; but years of experience seemed to lead back to father Langstroth. During the early '80's the whole beekeeping world swung from the ten-frame Langstroth to the eight-frame; and now we are swinging back from the eight to the ten. There was formerly a belief that a deep frame would winter bees better than the Langstroth; but when these frames were tested side by side, year in and year out, the Langstroth always seemed to hold its own. It is indeed remarkable that father Langstroth was so nearly right in so many things. While this winter may prove to be a severe one on bees, the size or shape of the frame will have nothing to do with it.—ED.]

Pyrox fills the barrel with the apples that used to be on top. Write BOWKER INSECTICIDE CO., Boston, for book.

Heads of Grain from Different Fields

Artificial Pasturage for Bees; Plants that Can be Grown Profitably

What is the best known plant that can be raised for bee pasture? I am thinking of sowing one or two acres of mignonette. Do you think that bees will stop on that, and neglect gathering honey from basswood or white clover one-half to three miles distant?

Oakfield, Wis., Feb. 22.

F. W. WELLS.

[As a general rule we may say that it is not advisable to grow any plants for the honey alone. If, therefore, you wish to put out artificial pastures for the bees, grow some plant that will yield seed or hay in addition to the honey. For this purpose we know of nothing better than nor quite the equal of alsike clover that is now being grown so extensively all over the United States. Next in order we would place buckwheat, red clover, sweet clover, and (in the Western States) alfalfa. Basswood is, of course, one of the greatest honey plants or trees in the world; but it takes so many years before it begins to yield nectar and lumber that the one who puts it out must have an idea for future generations.

Ordinary white clover is, of course, a splendid honey plant, and it yields a good forage for pasture. It is also being grown to a considerable extent. Red clover and peavine red clover yield considerable nectar; but the corolla tubes are so long that the average bee can not get very much honey from them. If, therefore, you desire to produce honey and hay you had better, by all means, grow alsike, sweet clover, or white clover, rather than either of the red clovers mentioned.

Sweet clover is one of the most valuable honey plants we know of, and, when cut early enough, it yields valuable hay for stock. In many sections of the country sweet clover is being put in to prepare the soil for other clovers; and on some waste lands where no other clover will thrive it will make fine pasturage for stock.

Mignonette is a wonderful honey plant, but that is about all that can be said of it. There is only a limited demand for the seed. There would not be enough of it grown to pull the bees off from clover, if it were within three miles.

Perhaps it would be well to explain that, in order to get any considerable amount of honey from artificial pasturage, we have to figure on anywhere from five to ten acres of pasturage to a colony of bees. In some cases, and particularly some seasons, a much less acreage would be necessary.—ED.]

Beehunting Pays

In reply to P. C. Chadwick, p. 39, I beg to say that any one would certainly know better than to save a swarm of bees from a tree if they are affected with foul brood. Right here the same law should apply, and should impose a fine of \$5.00 and costs for cutting a tree infected with foul brood, and saving either bees or honey, and also for failure or neglect to destroy effectually the entire contents of such a tree by burning, so that other bees near it may have no chance to convey any of the honey therefrom, and thus spread the disease. As to whether beehunting pays in a financial way or not is wholly at the option of the operator. Would it pay to buy bees in the spring, and kill them in the fall to get their honey? Does it pay to cut down the apple tree to get the apples? Does it pay to cut the hickory tree to get the nuts? Does it pay to kill the sheep to get the wool? In fact, does it pay to kill the goose that lays the golden egg? All bosh! I have made no misstatement. It pays *me* to hunt bees, and under the same management it would pay Mr. Chadwick or any one else. I should like to live in a country where I could find nine beetrées while walking a distance of two miles. I would soon have the bees in hives, or destroyed if diseased.

Union Center, Wis.

ELIAS FOX.

Bees Poisoned by Careless Spraying at an Experiment Station

Some time ago I wrote you that my bees were killed as a result of our experiment station spraying apple trees while in bloom. They deny that

the apple bloom was in condition to poison the bees. It is true that the early apple bloom had fallen; but Rome Beauty was in full bloom, and the bees were working busily on the blossoms. My bees were very strong at that time. They died by the thousand, the ground near the hives and close to the alighting-board being covered with dead bees. There was a great increase in the number of dead bees at the time of spraying, as the colonies were then very strong.

The bees did not starve to death, for some of the hives contained 25 pounds of honey at the time the bees died. Others had more than that amount.

The bees that did not die at once lingered in a weak condition. Moths fixed many; and others went into winter quarters with enough old honey for wintering, but not enough bees to cluster and keep warm. I do not understand why the bees that were weakened by the poison did not build up strong during the season. Many died in a few weeks after the spraying.

Of 48 colonies but 12 are living. I think that three-fourths of all the bees in Pleasant Co. and in Wood Co. went the same route because of careless spraying.

Salama, W. Va.

MARTIN WILKINSON.

Queen-rearing in Florida or Texas

I am interested in the queen-rearing business, and would like to know of a place where I can rear early queens. How would the west coast of Florida or Southwestern Texas do for that business? Do you know of a better place than either of these? Can you suggest a definite location in either of the above or any other section of the country?

Bradford, Ky.

M. A. AULICK.

[The west coast of Florida would be a very good place to rear queens if you could get away from the water and rivers where there are mosquito hawks. One great difficulty in rearing queens in Florida is these hawks, and the large red ants that have nests in trees. The mosquito hawks will sometimes paralyze queen-rearing operations in a few days, while the red ants will destroy whole colonies. There is no remedy for the mosquito hawks except to get into a locality where they have never been known to come in droves. You would have to get well away from water. In doing that you would get into desert country, probably where there would be no flora for bees. The nuisance of red ants can be overcome to some extent by placing the hives on leveled-off ground where there is no vegetation nor rubbish. Hives must be put up on stilts or framework. Grass or rubbish of any sort must be kept entirely away from the apiary for a distance of 25 or 30 feet. Do not leave boards of any kind on the ground. The apiary should be in the open, away from any trees.

Southwestern Texas might and probably would present better conditions for queen-rearing than any place in Florida.—ED.]

Paper Protection Not Sufficient in Cold Climates

Mr. Miller's paper protection, p. 73, Feb. 1, may be sufficient to carry bees through winter in Rhode Island; but my experience here in Central Wisconsin has proved it to be a failure in severe winters. To satisfy myself as to the merits of the black paper as a winter protection, I prepared two colonies in the fall of 1910 by placing a super on top, filled with planer shavings; then the cover, and then over and around the hive and super, not common tarred paper, but a heavy tarred felt. One of the colonies so prepared was strong in bees, the other having a less quantity. The entrances were $\frac{3}{8}$ in. deep by 7 in. long. The result was as follows: The stronger colony pulled through in a weak condition with a heavy loss of bees. The other pulled through the cold weather; but before the first of April there was not a live bee in the hive. During the same winter I had 15 colonies in my cellar, a part of which were light, both in stores and bees; but all wintered well. During the past few seasons I have adopted the Alexander plan of wrapping my hives with felt on removing them from the cellar; and this with me has proved to be very valuable. While I do not wish in any way to criticize Mr. Miller, yet I feel that I ought to sound a warning to the inexperienced beekeeper not to attempt

to winter bees outdoors in a climate where the mercury goes down from 30 to 40° below zero unless they are packed in chaff or double-walled hives.

Elroy, Wis., Feb. 9.

CHAS. SHELDON.

Great Demand for Bees in Orchards

Notwithstanding the extremely cold weather, bees have wintered much better than I expected. I have lost only a few. I have some fine colonies in strong condition which wintered outdoors in ten-frame single-walled hives. There is a wonderful demand for bees for fertilizing orchards in this State, and I am sorry to say that bees are decreasing greatly. In consideration of the fact that the planting of orchards is going forward in remarkable leaps and bounds, the demand for bees will increase considerably.

Notwithstanding the loss of bees by the unusually severe winter, the remarkably poor honey seasons of the past two years, and the terrible encroachment of bee diseases in this State, I am very optimistic; and personally I am satisfied that with beekeeping, as with all other industries, the time to go into it is when all other people are going out. The future for this special branch in this State looks very good and promising to me.

Harrisburg, Pa.

H. A. SURFACE,
Economic Zoologist.

The Cover Picture for Feb. 15

I can't tell you how surprised I was this morning to find on the cover of GLEANINGS for Feb. 15th the picture of our beeyard at our old home in Evart, Mich. The photograph was taken by W. Z. Hutchinson while on a visit to us about sixteen years ago, and we still have the original copy. While I was recovering from my surprise at seeing the picture in a place where we had no reason to look for it, I was thrown into fresh wonder as to how your father's Florida ducks and drakes got into our old trout stream; but in these days of moving pictures I suppose we are not to be surprised at any thing.

The man in the picture is Mr. Walker, and the buildings shown were our barn and shed, the house not appearing. The stream was a beautiful creek called Twin Creek, and many were the beautiful speckled trout the boys from our neighborhood pulled out of it. The scene is just off the banks of the Muskegon River. If the picture looks half as good to your readers as to our family they are, no doubt, charmed with this specimen of Mr. Hutchinson's photographic skill.

Cicero, Ill.

MRS. BYRON WALKER.

Honey Reports from California Not Misleading; a Crop of 38 Tons

I wish to enter a protest against what you say on page 35, Jan. 15, in regard to the honey reports from the West, when you make the statement that many of the reports were misleading, and that some producers were holding back the facts. The truth is, for Central California, that we did not expect a good crop early nor even in the middle of the season. I thought when you published Madary's report that it was about right. Here in the valley the bees commence to gather surplus from alfalfa about June 1. We begin to extract honey July 1, and get through Oct. 1. Last season we got the bulk of the honey during the last half of the season. Beekeepers tell me that this is true of the location west of us in the mountains. They have the sage first, then wild buckwheat, and last season we had a late heavy flow from blue curl.

I did not see any reports from Central California that looked misleading to me at the time they were published. Of course, when you say "the West," that is a big country, and you may have some excuse for talking so.

My crop was 38 tons. Early in the season I did not expect 24; but we are having a hard fight against both American and European foul brood.

Hanford, Cal.

P. H. BALES.

Recipe for Making Honey Vinegar

You say that anybody who can make cider vinegar can make honey vinegar. Nine out of ten, however, make the sweet vinegar sour, as nearly all use too much honey. In this case the microbes have died. I will here give a formula which will

make good vinegar. If the wash water from capplings is used, or dirty honey from trees, etc., a hydrometer must be used. This hydrometer must register 30 in the sweet water; and if clean honey is used in the proportion of 7 lbs. of honey to 5 gallons of water it should register 30. Here is the formula: Honey, 7 lbs.; water, 5 gallons; potassium bicarbonate, ½ ounce; sodium phosphate, ½ ounce; ammonium chloride, ½ ounce; a piece of yeast the size of a pea. The chemicals are used for the purpose of causing fermentation.

After a few days this makes a fine drink like sweet cider. When it has ceased to ferment, strain and put into a clean keg and add one quart of vinegar and some mother.

Big Wells, Texas.

READER.

Bees and Grapes

Can you give me any information in regard to some productive plant to sow for my bees—something that, with favorable weather conditions, will be in full flow about the time grapes are ripe? I had thought of Japanese buckwheat. If you would advise me to sow that, when should I do so, and how? How much would be required to sow half an acre? Where can I obtain it? I wrote you last summer, saying my neighbor complained that the bees were destroying his grapes. My object is to sow something on my place that will be yielding about the time grapes are ripe, and see if that will help matters.

Kewanee, Ill.

E. R. WILKINSON.

[We do not know of any thing you could set out that would be in bloom about the time that grapes begin to ripen—or, rather, at the time when the bees are liable to be bothersome. If you will investigate the matter thoroughly you will find that bees do not spoil nor injure in any way the sound fruit. See what Professor Surface and other writers have to say in this issue. If you could hand your copy of this number to your neighbor we believe he will be convinced that the bees were simply sucking the juice from grapes that were already spoiled.—ED.]

The Larger Part of Alfalfa Cut Before it Blooms

I have been interested in the different theories given concerning alfalfa bloom not giving as much bloom as formerly, and the practical reason has been overlooked. By far the larger part of the crop is cut before it blooms. The sheep-feeders here, in the best alfalfa section of the Arkansas Valley (western part of Bent Co.) cut the first crop just as soon as it begins to bloom, and the three other crops before blooming. All that is left is a small portion for seed. It is like Wateley's reason for white sheep eating more than black—"because there are more of them." So, conversely, the reason bees don't gather as much honey as formerly from alfalfa is, the alfalfa is cut before it blooms.

Of course, this sounds like treason to men with several hundred stands of bees to unload, and who use the real-estate-boomer slogan, "Be a booster and skin your sucker." I think men should be truthful in their statements concerning bee territory. Any one interested can come and see during July, August, and September, when hay is being cut. It will be seen that the first crop, cut in June, is the only one given any chance to bloom.

Las Animas, Col.

L. H. SWEETMAN.

The Gravenstein Apple

I can tell Mr. Root a little about the Gravenstein apple. I was born and raised close to the little village of Gravenstein. In the old garden belonging to the old-time castle stood the old apple tree from which all Gravenstein apple trees originated. It is surely the best apple that grows; but the tree is not hardy enough to grow in all climates and under all conditions. On the Pacific coast, in Washington and Oregon, is a climate like its native one, and there it grows to perfection.

Brush, Col.

DANIEL DANIELSON.

Bees Pleasant to Handle.

I am glad to say that the bees of this country are not like those described by Mrs. Henry A. Gooch, p. 766, Dec. 15, but are very pleasing creatures for a woman to work with.

ANNA SOMMER.

Ronne, Bornholm, Denmark, Jan. 11.

POULTRY DEPARTMENT

A. I. ROOT

CHICKEN THIEVES; WHAT SHALL WE DO TO PROTECT OUR VALUABLE STOCK FROM THEIR DEPREDACTIONS?

In our issue for Feb. 15, p. 106, I spoke of losing a duck and a drake. Well, about the middle of January two more were gone when the flock came home at night; and finally on Sunday evening when they got home my only remaining drake was gone. It was not so much the loss of the five ducks as it was the fact that I must stop letting my ducks run at large in the drainage canal that adjoins my five acres. After losing the two we went to considerable expense and trouble in making a fence in the rocky bottom of the stream so as to give them a place to swim in close to the shore; but as this prevented them largely from getting the moss and shellfish, the yield of eggs soon dropped off. Last, and by no means least, I was forced to conclude some one was taking *lessons* in theft—regular progressive lessons—and getting off “scot free,” every time. Something *had* to be done. I hardly need tell you I prayed over the matter again and again. The outcome as to what was best to be done was the following, which I clip from the Bradentown *Weekly Journal*:

“THOU SHALT NOT STEAL.”

Ed. Journal.—I have repeatedly, both in print and by correspondence, extolled Bradentown and vicinity as remarkably free from petty thieving, and remarked that, after being north all summer, we invariably find every thing about our premises intact on our return. Well, I greatly regret to be obliged to report we have at least a few sinners as well as saints in our midst. Five choice breeding ducks (with excellent records) have been taken from our flock recently. All were taken in midday—the first, the day before Thanksgiving; the second, the day before New Year’s day; two more in January, and the last, a large choice drake, the only one I had left, was taken yesterday, February 11 (probably while we were at church and Sunday-school); and to get him the culprit broke through a fence of barbed wire and poultry netting, drove him into a corner, and evidently killed him with stones taken out of the brook they waded through to get to the fence. Although the loss of this drake just now blocks my work with the incubator, and is a great inconvenience to me, this is nothing compared to letting some one (possibly a boy or boys) go on unhindered in the school of crime. Does it not behoove every industrious, law-abiding citizen to call a halt at such work in open daylight, and, mostiv, if not all, on Sunday? Such work may call a halt in developing an industry that this region seems particularly adapted to. A. I. Root.

The second clipping from the same journal, a week later, gives the result, as you see:

AN INTERRUPTED PILLAU.

The parties who have been making raids on Mr. A. I. Root’s ducks, as published in last week’s *Journal*, have been captured, and the ringleader, a young white man about 18 or 20 years old, is now in jail. Sheriff Wyatt walked up on them last Sunday as they were gathered around a fire out in the woods cooking a Pillau. Out of regard for the parents of the boys we withhold names, but we hope these parents will not withhold the lash.

The arrest of the gang of five boys was owing to the kind service of Dr. Morgan, a near neighbor and a longtime subscriber to GLEANINGS. He had but two ducks, and

at first decided to pen them up while at church on Sunday, but afterward concluded to leave them out in the canal and stay at home from church and watch. About 10 A.M. the ducks were missing. He followed along up the stream, and on coming to a piece of woods he saw smoke arising. Further along he found the feathers, and then came upon five boys with a kettle, cooking their duck. Without alarming them he proceeded to the nearest house, and called up by telephone the sheriff. Now, here is something I want you all to make note of. When the oldest one, and evidently the ringleader, was arrested he had a *cigarette* in his mouth, and kept right on smoking it, proclaiming that *he* “just happened” along, and was in no wise connected with the other youngsters; but (if I am correct) he was the one who announced, when the sheriff proceeded to confiscate the kettle (duck and all), “Here! that is my kettle.”

Now, friends, would it be a very long jump, in “jumping at conclusions,” to say it was *cigarettes* that stole my five ducks?

In that excellent book I have just referred to, the Corning Egg Farm, there is a chapter that is headed, “Policing the farm with bloodhounds, searchlights, and rifles;” and the chapter starts out with these words: “In the fall of each year, from almost every part of the country, come reports of what seems to be organized thieving in the poultry line,” and then the author tells about what they are doing with bloodhounds, searchlights, and sharpshooters. I need hardly tell you that these cigarette saloon-frequenter would just as soon take your most valuable fowl for a roast in the woods as any other, for there are veritable *heathen* right here in our land of schools and churches. Let me advise, in closing, the need of a law-and-order club among poultrymen, with dogs and detectives, to punish such offenders until they have had enough of it. Let a fund of money be raised that will be ample to meet the expense of getting the culprits, swift and sure. Since this matter came up, my neighbors, right and left, tell of having had valuable fowls stolen. Let me here repeat a little story I told you some years ago. When I was witnessing the early experiments of the Wright Bros. I boarded with a farmer whose wife was on a decline with the great white plague. To prolong the life of the poor woman (and they were poor financially) the doctors advised poultry-keeping in order to have her in the open air as much as possible. She became quite enthusiastic, succeeded with the poultry, and was improving in health, when one morning as she went out to liberate her pets that she had labored so hard for, to get them up to broiler age, she found every chick gone, and just the still empty coops. The shock and disappointment were so great she went into a decline, and not

long after went down to her death. A neighbor, who had been having similar losses, got up in the night and attempted to stop some thieves who were just making off with a load of his chickens, and the thieves turned a gun on him and ordered him to go back. He aroused his neighbors, and they followed them until they were lost with their booty in the saloon haunts of the great city of Dayton, Ohio, with its hundreds of saloons running day and night. How long, O Lord, shall this devastating curse afflict and discourage our hard-working and law-abiding citizens?

A BALANCED RATION; LETTUCE FOR DUCKS; MORE "DISCOVERIES," ETC.

Somebody said Prof. Holden had put corn on the witness stand, and made corn answer his questions. Well, I have been putting ducks and chickens on the witness stand, and I am going to tell you what answers they have given me. By the way, what a *big lot* of valuable "discoveries" I am making lately! Just think of it! yesterday I got 79 eggs from only 75 laying hens. Mrs. Root declares, however, that I should explain to you all that I gathered the eggs so late the day before that several laid after they were gathered; and this reminds me that our hens have got on such a craze to lay lately that they commence, some of them, at sunrise, and some of them are on the nests laying at sunset. How did I succeed in getting up such a "laying contest"? That is just the wonderful discovery I am going to explain to you.

When I was down on the island several years ago I told you about my flock of chickens that were all the time teasing for something and were never satisfied until I discovered they were hungry for animal food; and when I gave them a good "square meal" of fresh fish they all went and sat down in a row on a log, happy, contented, and *satisfied*. That was a lesson I have not forgotten, and I try to feed my ducks and chicks so that they will "go off and sit down," quiet and happy. Whenever they fail to do this, especially young growing stock, you may be sure they are *lacking* something. When my first brood of ducks from the incubator were about a month old they were always teasing uproariously for something. Their first feed was bread and milk, and I supposed they were begging for their milk ration that had been dropped, because milk costs so much down here. The only feed they would eat was a mash of bran and middlings; but they wanted it all the time, and I soon noticed their droppings looked very much as if the coarse bran was imperfectly digested, and began to wonder if the fine Florida sand I had been depending on for grit, was sufficient. I gave them some of the mica crystal grit that we always keep before the chickens, and there was an improvement. Seeing oyster shells advised by one of the poultry journals, for *ducks*, I tried them; and every pen of ducks, from the oldest to the youngest, took to them

greedily. One pen of four-weeks-old ducks ate such a quantity I feared to let them have *all* they wanted; but not until our neighbor Rood began shipping lettuce did we discover the "long-felt want." They at once dropped their grain and every thing else for the coveted lettuce, when they fairly got a taste of it. Well, my *discovery* that we have been so long getting at is this: Lettuce is not only *good* for ducks, but it takes the place, largely, of the expensive grains, shorts, and middlings. Just as soon as they had lettuce, all they could consume (and it takes about a wheelbarrowful a day for twenty six-weeks-old ducks) the amount of grain needed dropped off amazingly, and the whole lot of ducks would go off and sit in a row, and stay there for hours—a thing they had hardly done before since the day they were hatched. Of course, I knew ducks as well as chickens need green food as well as meat and grain; but as each of the three pens had quite a range, with Bermuda grass and other green stuff, it did not occur to me they were suffering for so large a quantity. They kept teasing for their mash, no matter how often I fed them, but they did not seem satisfied; but now they are growing at a rate that surprises everybody who passes along the highway. Have you not heard of babies that kept crying for something they scarcely seemed to know what it was themselves? Well, is it not possible that, like the ducks, something was lacking in order to let the little darlings make flesh and blood and bones, as nature intended? It may not pay to grow lettuce for ducks and chickens alone—that is, when they are full grown; but it certainly will pay, and pay well, to give small ducks and chicks all they can consume; and down here, where lettuce is grown by the acre, there is always more or less unfit to ship; and during this past very wet season there has been an unusual amount that is just the thing for fowls, but too far in maturity to think of sending to the Northern markets, so you see this is just the place for the "duck man." The large quantity of nice head lettuce given the laying hens is probably what has caused the "laying contest."* For a whole week, ending March 1, 75 hens have averaged about 60 eggs a day, but the price is down now to 20 cts. a dozen here.

The Russian government and the zemstvo organizations of that country are paying great attention to the development of beekeeping. Schools of apiculture are maintained, and staffs of apicultural instructors are sent to various points as needed. Peasants beginning beekeeping are given one or two proper hives free. In some cases hives are sold at low prices on the installment plan. Apiculture is a favorite occupation of small landowners and the working classes. —*Florida Times Union*.

*Just recently I have also given them a 10-cent box of ground mustard, a teaspoonful daily, in their daily mash,

DISCRIMINATING AGAINST OUR OWN PEOPLE

I clip the following from the *Ohio Farmer* for March 2:

WANTED—A REAL PARCELS POST

As you know, reader, from previous articles that have appeared in *The Ohio Farmer*, in carrying packages by mail, our government actually discriminates against its own people, in favor of other nations. Our postoffice department at Washington has "conventions," or agreements, with 29 other nations, by which it carries packages weighing up to 11 pounds from any postoffice in this country to any postoffice in those countries, for 12 cents per pound. For 12 cents per pound you can mail from your postoffice packages weighing up to 11 pounds, to London, Berlin, Vienna, Stockholm, Rio Janeiro, Valparaiso, Jerusalem, Melbourne, Tokio, Peking, Mukden, and to more than 10,000 other foreign postoffices scattered over the globe. But a package mailed to the next town, in the United States, must not exceed 4 pounds in weight, and the carrying charge is 16 cents for each pound.

And as though these discriminations were not enough, our postmaster-general has made arrangements with British postoffice authorities recently, whereby mail packages up to 11 pounds are carried from any postoffice in England, Scotland, Ireland, or Wales, to any postoffice in the United States, for the following charge: Up to 3 lbs., 30 cents; up to 7 lbs., 55 cents; up to 11 lbs., 79 cents. By this agreement a British subject can send 11 pounds in one package from his postoffice to your postoffice for 79 cents; while you wishing to mail matter weighing 11 pounds to your nearest postoffice in this country, must break it up into three packages of not over 4 pounds each, and pay \$1.76 postage—a discrimination of 100 per cent against you.

As allowed by law, the postmaster-general is steadily extending these special postal privileges to foreign nations. This is right, and best for all concerned. On the other hand, the only change congress has made in carrying parcels for our own people, during the last fifty years, was in 1875 when it raised the postage on parcels from 8 to 16 cents per pound—double the cost.

Well, after you have read the above twice over (or more) read this, from another part of the same issue.

EXPRESS CO. INVESTIGATION

The Interstate Commerce Commission has found in its investigation of the express companies that they have made charges above their published rates, and now hold in their treasuries \$81,957,893, a large proportion of which is excessive charges wrongfully obtained. Criminal proceedings have been ordered and an indictment has been returned against the Adams Co. The following are the companies and the amount in each treasury: American, \$33,635,603; Adams, \$24,133,486; United States, \$10,737,518; Wells-Fargo, \$7,936,377; Southern, \$3,902,853; Northern, \$999,551; Globe, \$386,856; Western, \$82,787; National, \$2350.

Where is the man or woman who has not contributed (under protest), more or less, to this fund of over *eighty millions*? And how long is our postal department going to continue to carry and deliver stuff for foreign nations at a lower price than she does to our own people? What is the matter of us? How about "By the people, for the people, and of the people"?

PUTNAM CO., FLA., AND ITS ARTESIAN WELLS.

GLEANINGS IN BEE CULTURE says that in Putnam County, Florida, "they do not have artesian wells," italicizing the "not." Has friend Root, who says that he owns land in that county, never observed the six-inch pipe at the back of the Putnam House, in Palatka, conveying the water from a flowing well at its base to the third story? The pressure on that pipe is so great that the writer remembers one day when the pipe gave way and all the gutters of the little city ran deep in sulphur water for days, blackening all the white-lead paint on the houses and the silver doorplates as well.

That is only one of the numerous wells, some flowing, in Putnam County.—*Jacksonville Times Union*.

We cheerfully give place to the above and humbly beg pardon for not being better posted. I had in mind, when making the statement, that there was no artesian well in the locality around and about Huntington, where my property is located. If I am mistaken in this I should be *very glad* to be corrected.

A. I. R.

Kind Words from Our Customers.

MILES APART ON EARTH, BUT CLOSE NEIGHBORS IN HEAVEN.

Dear Friend and Brother in Christ Jesus:—We are a good many miles apart here on earth; but when I read your writings in the Home department it is an inspiration. It seems to set the "joy bells" ringing, and makes us close neighbors in heaven. May the Lord bless you, and give you health and strength for years to come to help convert this country to Jesus. The old saloon serpent is dying a mighty hard death in Oklahoma, but the temperance people are on top, praise the Lord. Law and order, and love for God and home predominate in Oklahoma.

Perkins, Okla., July 28.

Z. S. HOSSELTON.

HOW GLEANINGS IN ITS MISSION ALL OVER THE WORLD HELPS PEOPLE.

In reading GLEANINGS for three years I noticed you had an agent in Dunedin, New Zealand. I had a sister who went to New Zealand in an early day, and her address I did not know and she did not know mine. The thought struck me if I could get an advertisement in some prominent paper in the island I might find her. So I asked the Box Co. in Dunedin to put in an advertisement I sent to them, and I would stand all expense. So in time I got a copy of the *Otago Daily Times*, with my advertisement in it, and a letter from my sister, one from her son, and one from the Alliance Box Co., telling me what they had done for me, and how much they were out of pocket, and said if I would hand it to you folks it would be all the same to them.

Pipstone, Minn.

FRASER MACKAY.

FOLKS WHO LIVE IN "GLASS HOUSES."

Fie on you, Bro. Root, after your scolding screed of a short time ago, on the carelessness of us poor chicken "journalists," to allow The A. I. Root Company (p. 8) to print the Almighty with a small g! (p. 84, Feb. 1). What will the Lord think of it? and from GLEANINGS!

Henville.

I. KETCHUM.

[Friend K., I "own up" and thank you for your very kind reproof. I want to say, however, that there is no difficulty in understanding what our good friend wanted to say, even if he did use a small G, whereas if a line is misplaced or omitted entirely it makes the whole sentence unintelligible. Our old and faithful proofreader, "W. P.," writes me he marked the above for correction; but our February issue, it got off without the correction being made. If the A. I. R. Co. lets this thing go on they will have to "take their medicine" like all the rest of us poor blundering mortals].

Convention Notices.

The North Texas Beekeepers' Association will hold its 31st meeting at Greenville, Texas, on the first Wednesday and Thursday in April, 1912. All beekeepers are cordially invited to attend. We are expecting to have a great meeting.

Greenville, Texas.

W. H. WHITE, Sec.

The annual meeting of the Connecticut Beekeepers' Association will be held Saturday, April 13, 1912, at Y. M. C. A. building. Good speaking. The matter of forming a branch of the National Association will be considered.

Hartford.

JAMES A. SMITH, Sec.